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**DETAILED TEST OBJECTIVES FOR THE
EXTENDED LONG TANK DELTA LAUNCH
VEHICLE, SPACECRAFT: AE-C**

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY

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PREPARED FOR THE NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION UNDER CONTRACT NAS7-811L,
COM 261

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PREFACE

This report was prepared by the McDonnell Douglas Astronautics Company-West (MDAC-W) for the National Aeronautics and Space Administration (NASA) under Contract NAS7-8111, COM 261. It is required in order to provide the detailed test objectives in support of the Extended Long Tank Delta launch of the AE-C spacecraft. The document satisfies the requirements specified by Mission Specification No. 203-02-00077, Revision Letter D.

The National Aeronautics and Space Administration is the sponsor of the Delta Program. The McDonnell Douglas Corporation is the prime contractor for the Extended Long Tank Delta vehicle.

ABSTRACT

This document contains the flight objectives for the Extended Long Tank Delta AE-C spacecraft mission. Included in the document are the trajectory printout and radar parameters.

The General Test Plan, Data and Support Requirements, Model Specification, Range Safety Trajectory and Aerodynamic Data, Orbital Error Analysis, and the spacecraft documentation in conjunction with this report constitute the complete test planning information.

CONTENTS

	<u>Page</u>
LIST OF FIGURES	viii
LIST OF TABLES	x
Section 1 INTRODUCTION	1-1
Section 2 MISSION AND VEHICLE OBJECTIVES	2-1
2.1 Primary Objective	2-1
2.1.1 Evaluation Criteria	2-1
2.1.2 Data Required	2-1
2.2 Secondary Objectives	2-1
Section 3 NOMINAL FLIGHT PLAN	3-1
3.1 General	3-1
3.2 Orbit Parameters	3-1
3.3 Vehicle Configuration	3-1
3.4 Trajectory Shaping Parameters	3-2
Section 4 TRAJECTORY INFORMATION	4-1
4.1 Nominal Trajectory Parameters	4-1
4.2 Instantaneous Impact Point Trace	4-1
4.3 Flight Azimuth Selection	4-1
4.4 Coast Phase Maneuvers	4-1
4.5 Second Stage Propellant Requirements	4-2
4.6 Radar Parameters	4-2
Section 5 SEQUENCE OF EVENTS	5-1
Section 6 DTO WEIGHT SUMMARY AND INFLIGHT MASS PROPERTIES HISTORY	6-1
Section 7 INSTRUMENTATION CHANNEL ASSIGNMENTS AND GROUND MONITORING ASSIGNMENTS	7-1
Section 8 REFERENCES	8-1
APPENDIX - MAIN PRINTOUT	
List of Symbols	A-1
Main Printout	A-15

FIGURES

<u>Number</u>		<u>Page</u>
4-1	Model 1900 Delta AE-C Axial Force Coefficient Vs. Mach Number - Low Drag Castor II Solid Motors - Zero Angle of Attack	4-40
4-2	Model 1900 Delta AE-C Trajectory Parameters - Altitude Vs. Surface Range	4-41
4-3	Model 1900 Delta AE-C Trajectory Parameters - Velocity History	4-42
4-4	Model 1900 Delta AE-C Trajectory Parameters - History of Acceleration Along Vehicle Centerline	4-43
4-5	1900 Delta Vehicle AE-C Spacecraft Mission Boost Phase Environmental Parameters	4-44
4-6	1900 Delta Vehicle AE-C Spacecraft Mission Boost Phase Environmental Parameters	4-45
4-7	Extended Long Tank AE-C IIP for Nominal First and Second Stages (Vacuum Re-entry)	4-46
6-1	Total Vehicle (Plot of Mass Vs. Time)	6-7
6-2	Total Vehicle Center of Gravity (Plot of X Arm Vs. Time)	6-8
6-3	Total Vehicle Roll Moment of Inertia (Plot of X Moment of Inertia Vs. Time)	6-9
6-4	Total Vehicle Pitch Moment of Inertia (Plot of Y Moment of Inertia Vs. Time)	6-10
6-5	Total Vehicle Yaw Moment of Inertia (Plot of Z Moment of Inertia Vs. Time)	6-11
6-6	Stage II and Payload (Plot of Mass Vs. Time)	6-12
6-7	Stage II and Payload Center of Gravity (Plot of X Arm Vs. Time)	6-13

FIGURES (Continued)

<u>Number</u>		<u>Page</u>
6-8	Stage II and Payload Roll Moment of Inertia (Plot of X Moment of Inertia Vs. Time)	6-14
6-9	Stage II and Payload Pitch Moment of Inertia (Plot of Y Moment of Inertia Vs. Time)	6-15
6-10	Stage II and Payload Yaw Moment of Inertia (Plot of Z Moment of Inertia Vs. Time)	6-16

TABLES

<u>Number</u>		<u>Page</u>
3-1	AE-C Spacecraft Mission Initial Conditions	3-3
3-2	Geodetic Parameters	3-4
3-3	AE-C Spacecraft Mission Trajectory Sequences	3-5
VEHICLE PARAMETERS USED IN TRAJECTORY CALCULATIONS		
3-4	Control Program	3-7
3-5	AE-C Weight Summary	3-8
3-6	Weight Flow and Thrust Simulation	3-10
TRAJECTORY PARAMETERS		
4-1	Orbit Injection (SECO)	4-3
4-2	Selected Trajectory Information	4-4
4-3	Mission Trade Factors	4-5
4-4	Impact Points for Premature Engine Cutoff Assuming Vacuum Re-Entry	4-6
4-5	AE-C Tracking Stations	4-9
4-6	Radar Parameters - South Vandenberg Air Force Base NASA T/M	4-10
4-7	Radar Parameters - Vandenberg Air Force Base T/M	4-16
4-8	Radar Parameters - Santiago, Chile	4-22

TABLES (Continued)

<u>Number</u>		<u>Page</u>
4-9	Radar Parameters - Tananarive, Madagascar	4-28
4-10	Radar Parameters - Johannesburg, South Africa	4-34

ADDITIONAL INFORMATION

6-1	Weight Summary - AE-C Mission	6-3
7-1	Instrumentation Channel Assignments - AE-C Mission	7-3
7-2	Ground Monitoring Assignments - AE-C Mission	7-21

Section 1

INTRODUCTION

The basic objective of the Delta Program is to provide a series of space research vehicles capable of accomplishing diverse space-probe and orbital missions.

This document contains the detailed test planning for launching the Atmospheric Explorer-C (AE-C) spacecraft (manufactured by Radio Corporation of America).

The AE-C mission is the first in a series of three Atmospheric Explorer spacecraft missions. The AE-C spacecraft has been designed to survey the global response of the atmosphere to solar radiation. The purpose of the Atmospheric Explorer Program is to make cause and effect studies and carry out the simultaneous measurements that are needed to achieve a detailed understanding of the physical processes that govern the lower thermosphere and ionosphere.

Section 2

MISSION AND VEHICLE OBJECTIVES

2.1 PRIMARY OBJECTIVE

The primary launch vehicle objective of the AE-C mission is the satisfactory injection of the spacecraft into the specified final orbit.

2.1.1 Evaluation Criteria

The Detailed Test Objective (DTO) trajectory was designed to satisfy the following mission orbit requirements:

- | | | |
|----|---------------------|-----------------------|
| A. | Apogee Altitude | 4,300 km (Integrated) |
| B. | Perigee Altitude | 156.6 km |
| C. | Inclination | 68.1 deg |
| D. | Latitude at Perigee | 13 deg |

The DTO trajectory also satisfies the following mission requirements:

1. Spacecraft separation is to occur 2 minutes after acquisition of signal at the Santiago, Chile, radar site (elevation angle, E^* , equals 8.8 deg).
2. The positive z-axis of the spacecraft is normal to the orbit plane at spacecraft separation and is directed toward the sun.

The trajectory was shaped for a 1,500-pound spacecraft to be injected into the desired orbit at second stage engine cutoff (SECO).

2.1.2 Data Required

Spacecraft tracking data.

2.2 SECONDARY OBJECTIVES

Demonstration of satisfactory first stage and second stage performance is required. Demonstration of satisfactory operation of checkout and launch equipment is also required.

Section 3

NOMINAL FLIGHT PLAN

3.1 GENERAL

The Detailed Test Objective (DTO) trajectory simulation satisfies the requirements established for the primary objective of the AE-C mission.

The AE-C spacecraft will be launched from the Western Test Range (WTR) at an initial flight azimuth of 196 degrees. The Delta vehicle Model 1900 will be utilized to inject the spacecraft into the desired orbit.

3.2 ORBIT PARAMETERS

The DTO trajectory simulation is designed to place the AE-C spacecraft into an 84.6 x 2,321.8 nautical mile (integrated) orbit* with an inclination of 68.1 degrees. The spacecraft will be injected such that the argument of perigee will be approximately 166 degrees; the latitude at perigee will be 13 degrees north. The following parameters at spacecraft injection (second stage engine cutoff: SECO) yield the desired orbit:

Altitude (n.mi.)	85.49
Inertial Velocity (ft/sec)	28,547.78
Inertial Elevation Flight Path Angle (deg)	-0.2642
Inertial Azimuth Flight Path Angle (deg)	157.3694

3.3 VEHICLE CONFIGURATION

The Delta launch vehicle Model 1900 consists of an Extended Long Tank booster with the MB-3 engine augmented by nine Castor II solid motors with low-drag nose cones, a 65-inch diameter Transtage ($\epsilon = 26.3:1$) second stage, and a 65-inch fairing. The first and second stage propulsion parameters incorporated in this DTO trajectory were obtained from References 1 and 2, respectively. A tag specific impulse ($I_{sp} = 294.3$) was incorporated into the second stage propulsion simulation in order to approximate the actual second stage assigned to the AE-C mission. The first stage performance was degraded by 36 feet per second to be consistent with the observed actual performance obtained from a statistical combination of past flights (Reference 3). The aerodynamic characteristics were obtained from References 4 and 5.

*Altitudes are based on an equatorial radius: 3,443.93 n.mi.

3.4 TRAJECTORY SHAPING PARAMETERS

The DTO trajectory simulation is designed for the vehicle to be launched from Pad SLC-2W at the Western Test Range. The geographical location of the launch pad and the South Vandenberg Air Force Base NASA T/M Station coordinates are given in Table 3-1. Geodetic parameters used in the trajectory calculations are given in Table 3-2. The trajectory sequences are listed in Table 3-3; this table indicates that six of the nine Castor II solid motors are ignited at liftoff while the remaining three are ignited 39 seconds after liftoff. All nine burned-out solid motor casings are jettisoned at 96 seconds. The spacecraft fairing is jettisoned at 285 seconds, which satisfies the maximum free molecular heating rate constraint of $0.1 \text{ BTU/ft}^2\text{-second}$. The vehicle control program is presented in Table 3-4. The weight summary and propulsion parameters are given in Tables 3-5 and 3-6, respectively.

Table 3-1

AE-C SPACECRAFT MISSION
INITIAL CONDITIONS

COORDINATES OF VEHICLE C.G. (THOR STATION 1567.2) AT LAUNCH PAD SLC-2W

Latitude (Geodetic)	34.755643 deg N
Longitude	120.62137 deg W
Elevation above MSL	196.40 ft

SOUTH VANDENBERG AIR FORCE BASE NASA T/M STATION COORDINATES

Latitude (Geodetic)	34.65542 deg N
Longitude	120.55498 deg W
Elevation above MSL	361 ft

LAUNCH AZIMUTH	259.5 deg (true)
INITIAL FLIGHT AZIMUTH	196 deg (true)
LIFTOFF WEIGHT	292121.7 lbs

Table 3-2

GEODETTIC PARAMETERS

1. Earth

Rotating oblate spheroid with

a) Equatorial radius = 20,925,722 ft.

b) Polar radius = 20,855,561 ft.

2. Gravity (attractive potential of the earth):

$$\begin{aligned}
 W(r_c, \rho') = \frac{GM}{r_c} & \left[1 - \frac{J_2 r_e^2}{3r_c^2} (3 \sin^2 \rho' - 1) \right. \\
 & + \frac{1}{2} \frac{J_3 r_e^3}{r_c^3} (5 \sin^3 \rho' - 3 \sin \rho') \\
 & \left. + \frac{1}{35} \frac{J_4 r_e^4}{r_c^4} (35 \sin^4 \rho' - 30 \sin^2 \rho' + 3) \right]
 \end{aligned}$$

where:

r_c = instantaneous distance from the center of the earth to the vehicle, (ft)

ρ' = instantaneous vehicle geocentric latitude, (deg)

r_e = equatorial radius of the earth, (ft)

$J_2 = 1.6241 \times 10^{-3}$ (second zonal harmonic)

$J_3 = 2.30 \times 10^{-6}$ (third zonal harmonic)

$J_4 = 7.96 \times 10^{-6}$ (fourth zonal harmonic)

$GM = 1.4076532 \times 10^{16} \text{ ft}^3/\text{sec}^2$ (product of the gravitational constant and the mass of the earth)

3. Atmosphere

U.S. Standard Atmosphere of 1962

4. Constants

a) one nautical mile = 6076.1155 ft.

b) weight to mass ratio = 32.17405 ft/sec²

Table 3-3

AE-C SPACECRAFT MISSION
TRAJECTORY SEQUENCES

<u>TIME (SEC)</u>	<u>EVENT</u>
0.000	Stage I Liftoff
2.000	Begin Stage I Roll Program
10.000	Begin Stage I Pitch Program
10.000	Begin Stage I Yaw Program
16.000	End First Pitch Rate - Stage I
16.000	End First Roll Rate - Stage I
16.000	End First Yaw Rate - Stage I
20.500	Begin Second Pitch Rate - Stage I
37.000	End Second Pitch Rate - Stage I
37.000	Begin Third Pitch Rate - Stage I
38.614	Solid Motor Burnout (six)
39.000	Ignition Solid Motors (three)
50.000	End Third Pitch Rate - Stage I
50.000	Begin Fourth Pitch Rate - Stage I
60.000	End Fourth Pitch Rate - Stage I
60.000	Begin Fifth Pitch Rate - Stage I
75.000	End Fifth Pitch Rate - Stage I
75.000	Begin Sixth Pitch Rate - Stage I
77.814	Solid Motors Burnout (three)
85.000	End Sixth Pitch Rate - Stage I
85.000	Begin Seventh Pitch Rate - Stage I
96.000	Jettison Solid Motor Casings (nine)
100.000	End Seventh Pitch Rate - Stage I
100.000	Begin Second Roll Rate - Stage I
100.000	Begin Second Yaw Rate - Stage I
120.000	End Stage I Roll Program

Table 3-3 (Concluded)

AE-C SPACECRAFT MISSION
TRAJECTORY SEQUENCES

<u>TIME (SEC)</u>	<u>EVENT</u>
120.000	End Stage I Yaw Program
120.000	Begin Eighth Pitch Rate - Stage I
269.559	End Stage I Pitch Program
269.559	MECO
275.559	Vernier Engine Cutoff
277.559	Stage I-II Separation
281.559	Stage II Ignition Signal
281.859	Stage II 88 Percent Chamber Pressure
283.559	Begin Stage II Pitch Program
285.000	Jettison Fairing
611.087	Second Engine Cutoff Command
611.432	End Stage II Pitch Program
611.432	Second Engine Cutoff
630.000	Perigee of Final Orbit (Latitude = 13.0°N)
660.000	Begin Coast Phase Yaw Program
760.000	End Coast Phase Yaw Program
1375.652	Acquisition of Signal - Santiago (E* = 8.8 Degrees)
1459	
1459.000	Begin spin-up maneuver
1495.652	Jettison Stage II, Activate Retro System
2062.268	Loss of Signal - Santiago (E* = 5 Degrees)
2636.095	Acquisition of Signal - Johannesburg (E* = 5 Degrees)
2908.931	Acquisition of Signal - Tananarive (E* = 5 Degrees)
4602.344	Apogee of Final Orbit (Integrated Apogee = 2321.8 N.M.)

Table 3-4

VEHICLE PARAMETERS USED IN TRAJECTORY CALCULATIONS

CONTROL PROGRAM

STAGE	TIME (SEC)	PITCH (DEG/SEC)	YAW (DEG/SEC)	ROLL (DEG/SEC)
FIRST	0.0000	2.0000	0.0000	0.0000
	2.0000	10.0000	0.0000	4.53571
	10.0000	16.0000	-1.12072	4.53571
	16.0000	20.5000	0.0000	0.0000
	20.5000	37.0000	-.49109	0.0000
	37.0000	50.0000	-.52688	0.0000
	50.0000	60.0000	-.51793	0.0000
	60.0000	75.0000	-.64915	0.0000
	75.0000	85.0000	-.56465	0.0000
	85.0000	100.0000	-.58700	0.0000
	100.0000	120.0000	0.0000	1.40000
	120.0000	269.5590	-.22116	0.0000
	269.5590	277.5590	0.0000	0.0000
	277.5590	283.5590	0.0000	0.0000
	283.5590	611.0870	-.08178	0.0000
SECOND	660.0000	760.0000	-.88295	0.0000

*NEGATIVE VALUES INDICATE NOSE=DOWN PITCH

**NEGATIVE VALUES INDICATE YAW TO LEFT AS VIEWED FROM REAR OF VEHICLE

***NEGATIVE VALUES INDICATE COUNTER=CLOCK WISE ROLL AS VIEWED FROM REAR OF VEHICLE

Table 3-5

AE-C WEIGHT SUMMARY

ITEM	WEIGHT (LB)
1. Second Stage Useful Load	1548.0
AE-C Spacecraft 1500 lb	
Attach Fitting 48 lb	
2. Dry Second Stage	1754.0
3. Trapped Propellants	15.3
4. Helium	20.3
5. Nitrogen	9.7
6. Propellant Reserve	226.0
7. Spacecraft Separation	3573.3
8. Nitrogen used during coast and first burn	9.0
9. Ablative Expendables	7.1
10. Second Stage Engine Cutoff	3589.4
11. Stop Transient and TCA Boiloff	9.3
12. Propellant Consumed	10064.9
13. Fairing	568.0
14. Start Transient	3.1
15. Second Stage Ignition	14234.7
16. First to Second Stage Adapter	258.0
17. Dry Booster	9281.0
18. Trapped Propellants and Gases	997.0
19. Residual Propellants	410.2
20. Residual Vernier Propellants	54.0
21. Vernier Engine Cutoff	25234.9
22. Vernier Propellants Consumed	44.0
23. Main Engine Stop Losses	66.0
24. Main Engine Cutoff	25344.9
25. Liquid Propellants Consumed	177872.8
26. Liquid Propellants and Gases Vented	196.0
27. Solid Motor Cases (Six)	9545.8

Table 3-5 (Concluded)

AE-C WEIGHT SUMMARY

<u>ITEM</u>	<u>WEIGHT (LB)</u>
28. Solid Motor Cases (Three)	4772.9
29. Solid Motor Propellant and Inerts Consumed (Six)	49572.2
30. Solid Motor Propellant and Inerts Consumed (Three)	24786.1
31. Solid Motor Start Losses (Three)	57.0
32. Solid Motor Nozzle Plugs (Three)	24.0
<hr/>	
33. Liftoff	292171.7

Table 3-6

VEHICLE PARAMETERS USED IN TRAJECTORY CALCULATIONS

WEIGHT-FLOW AND THRUST SIMULATION

TIME(SEC)	WEIGHT (LBS)	W DOT (LBS/SEC)	W DBL DOT (LBS/SEC ²)	F SUB 0 (LBS)	F PRIME (SO FI)	F DOT (LBS/SEC)
0.000	1.0000	292171.7	-1539.7177	416748.3	28.9321	-519.7600
1.000	2.0000	290609.7	-1580.4687	416231.6	28.9321	14888.9800
2.000	3.0000	289024.8	-1621.9230	431120.5	28.9321	5854.2600
3.000	4.0000	287401.0	-1649.6046	436974.8	28.9321	8699.5800
4.000	5.0000	285750.2	-1682.6953	445670.4	28.9321	8721.6100
5.000	6.0000	284066.8	-1716.6584	454392.0	28.9321	9376.5400
6.000	8.0000	282349.5	-1769.2614	463768.5	28.9321	9448.5100
8.000	10.0000	278808.4	-1843.0109	482665.5	28.9321	10142.5700
10.000	12.0000	275120.2	-1915.6618	502950.7	28.9321	9429.2150
12.000	14.0000	271286.4	-1983.4130	521809.1	28.9321	8609.0050
14.000	16.0000	267317.6	-2044.3060	539027.1	28.9321	7986.8400
16.000	18.0000	263227.4	-2096.8647	555000.8	28.9321	6459.5180
18.000	20.0000	259032.2	-2136.5740	567919.8	28.9321	5049.5150
20.000	22.0000	254757.6	-2167.1258	578018.9	28.9321	3920.5950
22.000	24.0000	250422.1	-2185.2657	588601.0	28.9321	1994.6490
24.000	26.0000	246050.4	-2192.9821	589849.3	28.9321	1021.7250
26.000	28.0000	241663.5	-2189.5089	591892.8	28.9321	-828.8050
28.000	30.0000	237283.7	-2178.9682	590235.2	28.9321	-2804.3650
30.000	32.0000	232941.5	-2135.9017	584426.4	28.9321	-5449.9150
32.000	34.0000	228669.5	-2090.3667	573526.6	28.9321	-4059.9100
34.000	36.0000	224488.5	-2073.6976	565406.8	28.9321	-524.2350
36.000	36.9900	220340.5	-2022.2488	564358.3	28.9321	-24857.1414
36.9900	37.0000	218339.1	-1966.8419	539749.8	28.9321	-417717.0000
37.000	38.0000	216319.4	-1427.3339	535572.6	28.8851	-288941.1700

Table 3-6 (Continued)

VEHICLE PARAMETERS USED IN TRAJECTORY CALCULATIONS

WEIGHT FLOW AND THRUST SIMULATION

TIME (SEC)	WEIGHT (LBS)	W DOT (LBS/SEC)	W DBL DOT (LBS/SQ SEC)	F SUB 0 (LBS)	F PRIME (SQ FT)	F DOT (LBS/SEC)
38.0000	38,6140	216900.2	-775,1507	246631.4	24,0393	-87609.2248
39.0000	39,2000	216207.2	-954,8259	216128.3	12,0139	497167.7500
39.2000	40,0000	216015.5	-1144,4947	315561.9	20,4730	-6869.7625
40.0000	42,0000	215100.1	-1144,7417	310066.9	20,4730	3479.7450
42.0000	44,0000	212809.2	-1173,8314	317014.4	20,4730	3895.6950
44.0000	46,0000	216461.6	-1205,8894	324805.8	20,4730	4484.2700
46.0000	48,0000	208049.8	-1240,2726	333774.3	20,4730	4718.0700
48.0000	50,0000	205569.1	-1276,4751	343210.4	20,4730	4759.8550
50.0000	52,0000	203016.0	-1310,9178	352730.2	20,4730	4506.6200
52.0000	54,0000	200394.0	-1342,3358	361743.4	20,4730	4089.6200
54.0000	56,0000	197709.1	-1370,8793	369922.6	20,4730	3670.9200
56.0000	58,0000	194967.1	-1394,0156	377264.5	20,4730	2802.0750
58.0000	60,0000	192178.9	-1411,2575	382868.6	20,4730	2242.1600
60.0000	62,0000	189356.3	-1423,8976	387352.9	20,4730	1472.5000
62.0000	64,0000	186500.4	-1429,8851	390297.9	20,4730	783.9050
64.0000	66,0000	183648.6	-1431,4060	391865.8	20,4730	82.1900
66.0000	68,0000	180785.8	-1426,2793	392030.1	20,4730	-903.7000
68.0000	70,0000	177933.4	-1413,4771	390222.7	20,4730	-1916.0300
70.0000	72,0000	175106.7	-1391,9870	386390.7	20,4730	-3060.8950
72.0000	74,0000	172323.0	-1373,2055	380268.9	20,4730	-842.6800
74.0000	76,0000	169576.6	-1360,7852	378583.5	20,4730	-5286.4600
76.0000	76,1900	166855.6	-1324,4639	368010.6	20,4730	-12449.3158
76.1900	77,0000	166604.0	-1102,2099	365645.2	20,4730	-145456.0247
77.0000	77,8140	165714.1	-747,2378	247825.9	18,5707	-68809.7543
77.8140	78,0000	165170.9	-665,5645	191814.7	12,0139	-8.2258

Table 3-6 (Continued)

VEHICLE PARAMETERS USED IN TRAJECTORY CALCULATIONS

WEIGHT FLOW AND THRUST SIMULATION

TIME (SEC)	WEIGHT (LBS)	W DOT (LBS/SEC)	W DBL. DOT (LBS/SQ SEC)	F SUB 0 (LBS)	F PRIME (SQ FT)	F DOT (LBS/SEC)
78.0000	80.0000	-665.5593	.0073	191813.2	12.0139	-2.0790
80.0000	96.0000	-665.5446	-.1100	191809.0	12.0139	32.3125
96.0000	142.0000	-667.3050	.1543	192326.0	12.6139	-45.1394
112.0000	144.0000	-664.8355	.1020	191603.8	12.0139	-29.7253
144.0000	176.0000	-661.5724	.1828	190652.6	12.0139	-53.7269
176.0000	208.0000	-655.7241	.1535	188933.3	12.0139	-46.0978
208.0000	240.0000	-650.8116	.2797	187458.2	12.0139	-84.9494
240.0000	248.0000	-641.8608	.4328	184739.8	12.0139	-140.2312
248.0000	256.0000	-638.3986	.5516	183618.0	12.0139	-171.9513
256.0000	260.0000	-633.9849	.7348	182242.4	12.0139	-248.6525
260.0000	264.0000	-631.0458	.9769	181247.8	12.0139	-305.4550
264.0000	266.0000	-627.1384	1.2408	180025.9	12.0139	-437.7950
266.0000	268.0000	-624.6565	1.9677	179150.3	12.0139	-603.4150
268.0000	269.0000	-620.7212	1.6374	177943.5	12.0139	-590.6500
269.0000	269.5590	-619.0833	1.43074	177352.9	12.0139	-4403.8252
269.5590	269.8920	-204.8045	0.0000	58977.0	0.0000	0.0000
269.8920	269.8930	0.0000	0.0000	58977.0	0.0000	-5705700.0000
269.8930	275.5590	-7.3773	0.0000	1920.0	0.0000	0.0000
SECOND STAGE						
281.7690	281.8590	-30.5203	.88.1056	1815.5	0.0000	79719.0667
281.8590	282.5590	-30.5908	.0023	8990.2	0.0000	-1.9673
282.5590	291.5590	-30.5892	.0048	8988.8	0.0000	-1.1484
291.5590	301.5590	-30.5461	.0009	8978.5	0.0000	-1.4248
301.5590	321.5590	-30.5369	.0022	8974.3	0.0000	.8475
321.5590	441.5590	-30.5800	.0049	8991.2	0.0000	1.5499
441.5590	481.5590	-31.1687	.0035	9177.2	0.0000	1.1773

Table 3-6 (Concluded)

VEHICLE PARAMETERS USED IN TRAJECTORY CALCULATIONS

WEIGHT FLOW AND THRUST SIMULATION

TIME (SEC)	WEIGHT (LBS)	W DOT (LBS/SEC)	W DBL DOT (LBS/50 SEC)	F SUB 0 (LBS)	F PRIME (50 FI)	F DOT (LBS/SEC)
481.5590 -	7496.0	31,3079	.0004	9224.3	0.0000	0.2279
501.5590 -	6870.0	31,2989	.0046	9219.7	0.0000	1.2746
521.5590 -	6244.8	31,2073	.0093	9194.2	0.0000	3.0862
531.5590 -	5933.3	31,1141	.0168	9163.4	0.0000	4.7972
541.5590 -	5623.0	30,9459	.0325	9115.4	0.0000	10.0221
551.5590 -	5315.2	30,6213	.0500	9015.2	0.0000	14.3542
561.5590 -	5011.4	30,1211	.0589	8871.7	0.0000	18.3693
571.5590 -	4713.2	29,5321	.0637	8688.0	0.0000	18.4472
581.5590 -	4421.0	28,8949	.0712	8503.5	0.0000	21.7962
601.5590 -	3857.4	27,4704	.0670	8067.6	0.0000	19.6241

Section 4

TRAJECTORY INFORMATION

Vehicle and trajectory parameters used in the preparation of the AE-C mission DTO trajectory are described in this section. Also discussed are the instantaneous impact points, flight azimuth selection, coast phase maneuvers, second stage propellant requirements, and radar parameters. A trajectory printout key and definition of symbols are included with the trajectory printout in the appendix.

4.1 NOMINAL TRAJECTORY PARAMETERS

Trajectory conditions at orbit injection (SECO) and the corresponding orbital parameters are listed in Table 4-1. Table 4-2 presents such additional parameters as velocity, altitude, flight path angles, etc., at significant time points from liftoff to injection. Pertinent mission trade factors are presented in Table 4-3. Axial force coefficients and altitude, velocity, and axial acceleration histories are presented in Figures 4-1 through 4-4, respectively. The boost phase environmental parameters are presented in Figures 4-5 and 4-6.

4.2 INSTANTANEOUS IMPACT POINT TRACE

The nominal first and second stage vacuum instantaneous impact points (IIP) for a premature engine cutoff are printed in the glide phase portion of the trajectory. For convenience, the vacuum impact points up to the time at which the second stage achieves orbit are tabulated in Table 4-4. Figure 4-7 displays the nominal IIP trace.

4.3 FLIGHT AZIMUTH SELECTION

Based on past flight experience, a flight azimuth of 196 degrees was chosen. This azimuth provides an acceptable trajectory from a range safety standpoint and satisfies the mission requirements with an adequate performance margin. A large first stage yaw maneuver is necessary to attain the desired orbit inclination; however, the vehicle IIP trace does not cross the South American land mass (see Figure 4-7).

4.4 COAST PHASE MANEUVERS

After injection (SECO) into the desired orbit, the launch vehicle performs a yaw maneuver to orient the spacecraft pitch axis normal to the orbit plane with the +Z-axis of the spacecraft toward the sun. The +Z-axis is aligned with the centerline of the vehicle pointing aft; therefore, the second stage is to be yawed away from the sun. Based on the current launch window of approximately

0553 to 0653 Greenwich Mean Time (GMT); a yaw left maneuver is required. Prior to spacecraft separation, the second stage is spun up to approximately 10 rpm. A cursory investigation indicates that approximately 20 seconds should be allowed for this maneuver. The nominal spacecraft separation will occur 120 seconds after the acquisition of signal of the Santiago, Chile, tracking station (1,495.652 seconds after liftoff).

4.5 SECOND STAGE PROPELLANT REQUIREMENTS

The nominal second stage propellant consumption (PC) is 97.80 percent at SECO. The mean propellant utilization to depletion is established at 99.722 percent. This establishes a command shutdown probability in excess of 99 percent based on an assumed sigma propellant utilization requirement of 0.55 percent (Reference 6). The corresponding velocity reserve of the second stage is 532 feet per second.

4.6 RADAR PARAMETERS

Table 4-5 presents the geographic locations of the following radar stations:

- A. South Vandenberg Air Force Base NASA T/M
- B. Vandenberg Air Force Base T/M
- C. Santiago, Chile
- D. Tananarive, Madagascar
- E. Johannesburg, South Africa

Tables 4-6 through 4-10 present the radar parameters (i.e., slant range, radar azimuth, radar elevation, and radar look angles) for each of these stations, respectively. The South Vandenberg Air Force Base NASA T/M radar data are also presented in the trajectory printout (in the appendix).

Table 4-1

AE-C

TRAJECTORY PARAMETERS
ORBIT INJECTION (SECO)

Time (sec)	611.432
Inertial Velocity, V_I (fps)	28547.785
Inertial Elevation Flight Path Angle, γ_{1I}' (deg)	-0.2642
Inertial Azimuth Flight Path Angle, γ_{2I}' (deg)	157.3694
Distance From Earth's Center, R_C (ft)	21440928.1
Altitude, h (n.mi.)	85.493
Perigee Radius, R_p (n.mi.)	3528.530
Apogee Radius, R_A (n.mi.)	5774.054
Vehicle Geocentric Latitude, ρ' (deg)	14.226
Vehicle Longitude, μ (deg)	112.976
Orbit Eccentricity, e (---)	0.2413871
Orbit Inclination, (deg)	68.10000
Period of Orbit, P (min)	132.61121
Vehicle Weight, W (lbs)	3589.4
Vehicle Centerline Elevation Angle, θ_L' (deg)	1.747
Vehicle Centerline Azimuth Angle, γ_L' (deg)	156.489

Table 4-2

TRAJECTORY PARAMETERS - SELECTED TRAJECTORY INFORMATION

	LAUNCH	MAX. DYNAMIC		MECO	STAGE	
		PRESSURE			I-II SEP	SECO
TIME, (SEC)	0.000	37,000	269,559	277,559	611,432	
SURFACE RANGE, S (N MI)	10	14	18419	20417	129078	
ALTITUDE, (N MI)	10	2.5	63.3	66.2	85.5	
INERTIAL VELOCITY, V (FT/SEC)	1255.07	1577.34	16164.59	16169.01	28347.78	
VEHICLE VELOCITY RESPECT TO LAUNCH	100	1054.17	15651.19	15654.77	27999.59	
PT., V (FT/SEC)						
INERTIAL ELEVATION FLIGHT PATH	.000	40,231	8,322	7,799	-1.264	
ANGLE, (DEG)						
INERTIAL AZIMUTH FLIGHT PATH	90.000	102,413	154,701	154,788	157,369	
ANGLE, (DEG)						
ELEVATION FLIGHT PATH ANGLE	90.000	74,935	8,439	7,900	-1.354	
(DEG)						
AZIMUTH FLIGHT PATH ANGLE	180.000	196,977	159,142	159,244	160,233	
(DEG)						
THRUST, F (LBS)	35595612	501193.3	174891.1	0.0	7873.8	
VEHICLE WEIGHT, W (LBS)	29217117	218319.4	25344.9	14234.7	3589.4	
VEHICLE AXIAL ACCELERATION, (FT/SQ SEC)	39.20	67.34	222.01	0.00	70.58	
VEHICLE LONGITUDE, (DEG)	120.621	120,624	119,865	119,726	112,976	
VEHICLE GEOMETRIC	34.876	34,569	31,561	31,250	14,226	
LATITUDE, (DEG)						
DYNAMIC PRESSURE, (LBS/SQ FT)	100	828.75	.01	.00	.00	
TOTAL ANGLE OF ATTACK, (DEG)	100	115	5.64	5.88	4.25	
RADAR SLANT RANGE, D* (N MI)	618	7.0	191.0	210.9	1295.4	
RADAR AZIMUTH ANGLE, A* (DEG)	331.338	328,534	168,597	167,609	159,457	
RADAR ELEVATION ANGLE, E* (DEG)	-1.263	20,269	17,832	16,615	27,009	
RANGE RATE, D* (FT/SEC)	-100	184,22	15075.07	15138.93	27046.17	

Table 4-3

MISSION TRADE FACTORS

1900 MODEL VEHICLE

$$\text{I. } \frac{\partial V_{\text{TOTAL}}}{\partial W_{\text{PL}}} = -2.30 \text{ fps/lbs}$$

$$\text{II. } \frac{\partial PC_2}{\partial W_{\text{PL}}} = 8.530 \times 10^{-3} \frac{\%PC}{\text{lbs}}$$

$$\text{III. } \frac{\partial R_A}{\partial V_{\text{TOTAL}}} = .938 \frac{\text{n.mi.}}{\text{fps}}$$

Table 4-4

TRAJECTORY PARAMETERS

IMPACT POINTS FOR PREMATURE ENGINE CUTOFF ASSUMING VACUUM RE-ENTRY

PREMATURE CUTOFF TIME (SEC)	IMPACT RANGE (N MI)	IMPACT * LONGITUDE (DEG)	IMPACT ** LATITUDE (DEG)	TIME TO IMPACT MEASURED FROM LAUNCH (SEC)
20.0000	1.289	120.623	34.751	50.807
30.0000	1.681	120.632	34.729	86.815
40.0000	4.449	120.648	34.685	118.242
50.0000	7.496	120.666	34.636	138.162
60.0000	12.985	120.699	34.548	162.371
70.0000	22.274	120.754	34.400	189.816
80.0000	33.472	120.820	34.221	213.034
90.0000	41.972	120.869	34.086	226.468
100.0000	52.561	120.931	33.917	239.852
110.0000	65.276	120.969	33.705	254.047
120.0000	78.308	120.928	33.473	268.996
130.0000	92.515	120.841	33.222	284.396
140.0000	109.149	120.741	32.936	299.520
150.0000	128.781	120.622	32.605	315.253
160.0000	151.536	120.480	32.228	331.251
170.0000	177.871	120.312	31.797	347.601
180.0000	208.349	120.114	31.303	364.421
190.0000	243.749	119.881	30.733	381.875
200.0000	285.195	119.604	30.071	400.195
210.0000	334.172	119.275	29.293	419.699
220.0000	392.697	118.881	28.366	440.825
230.0000	464.255	118.401	27.239	464.303
240.0000	554.289	117.804	25.823	491.355
250.0000	672.062	117.037	23.972	524.108

Table 4-4 (Continued)

TRAJECTORY PARAMETERS

IMPACT POINTS FOR PREMATURE ENGINE CUTOFF ASSUMING VACUUM RE-ENTRY

PREMATURE CUTOFF TIME (SEC)	IMPACT RANGE (N MI)	IMPACT * LONGITUDE (DEG)	IMPACT ** LATITUDE (DEG)	TIME TO IMPACT MEASURED FROM LAUNCH (SEC)
260.0000	836.298	115.998	21.398	566.915
269.5590 (MEC0)	1075.288	114.547	17.625	626.460
270.0000	1078.872	114.526	17.569	627.339
280.0000	1080.809	114.515	17.538	627.810
290.0000	1104.483	114.375	17.165	633.598
300.0000	1134.301	114.200	16.694	640.805
310.0000	1164.717	114.021	16.314	648.063
320.0000	1195.820	113.839	15.724	655.394
330.0000	1227.691	113.654	15.221	662.817
340.0000	1260.427	113.464	14.704	670.354
350.0000	1294.126	113.269	14.172	678.028
360.0000	1328.900	113.068	13.623	685.865
370.0000	1364.078	112.861	13.055	693.894
380.0000	1402.216	112.648	12.465	702.150
390.0000	1441.096	112.426	11.851	710.675
400.0000	1481.740	112.195	11.209	719.517
410.0000	1524.411	111.953	10.534	728.738
420.0000	1569.439	111.700	9.822	738.410
430.0000	1617.236	111.431	9.067	748.626
440.0000	1668.318	111.146	8.259	759.504
450.0000	1723.338	110.840	7.388	771.191
460.0000	1783.126	110.508	6.442	783.882
470.0000	1848.951	110.146	5.400	797.846
480.0000	1922.345	109.743	4.238	813.454
490.0000	2005.626	109.287	2.919	831.234

Table 4-4 (Concluded)

TRAJECTORY PARAMETERS

IMPACT POINTS FOR PREMATURE ENGINE CUTOFF ASSUMING VACUUM RE-ENTRY

PREMATURE CUTOFF TIME (SEC)	IMPACT RANGE (N MI)	IMPACT * LONGITUDE (DEG)	IMPACT ** LATITUDE (DEG)	TIME TO IMPACT MEASURED FROM LAUNCH (SEC)
500.0000	2102.175	108.762	1.389	851.949
510.0000	2217.392	108.136	-1.438	876.915
520.0000	2360.449	107.361	-2.706	908.218
530.0000	2548.591	106.338	-5.688	949.940
540.0000	2819.703	104.845	-9.983	1011.055
550.0000	3283.308	102.182	-17.305	1117.664
560.0000 ***	4580.643	92.869	-37.410	1423.418
570.0000	6369.260	64.810	-61.690	1850.683
580.0000	6369.260	64.810	-61.690	1850.683
590.0000	6369.260	64.810	-61.690	1850.683
600.0000	6369.260	64.810	-61.690	1850.683
610.0000	6369.260	64.810	-61.690	1850.683
611.4320 (SECO)	6369.260	64.810	-61.690	1850.683

* POSITIVE INDICATES WEST LONGITUDE
 ** POSITIVE INDICATES NORTH LATITUDE
 *** ACHIEVES ORBIT AT 563 SECONDS

Table 4-5

AE-C TRACKING STATIONS

<u>STATION</u>	<u>GEODETTIC LATITUDE (DEG)</u>	<u>LONGITUDE (DEG)</u>	<u>HEIGHT (FT)</u>
NASA T/M	34.65542	120.55498	361
VAFB T/M	34.565656	120.50018	2950
SANTIAGO	-33.15076	70.66576	2402
TANANARIVE	-19.027597	-47.301208	4465
JOHANNESBURG	-25.88782	-27.70676	5135

Table 4-6

AE-C SPACECRAFT MISSION RADAR PARAMETERS

SOUTH VANDENBERG AIR FORCE BASE NASA T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
0.0	6,843	-0.0	331,338	-1,283	90,00	0,00	0,00
2.0	6,843	-0.0	331,338	-1,263	90,15	198,20	0,01
5.0	6,843	-0.0	331,338	-1,139	90,02	184,60	0,01
10.0	6,843	1.3	331,337	1,438	89,43	161,94	0,03
15.0	6,844	-1.3	331,309	1,688	92,08	139,29	4,23
16.0	6,844	-3.4	331,290	2,041	92,69	134,77	4,87
20.0	6,840	-7.6	331,140	3,858	90,86	134,78	4,89
20.5	6,839	-7.2	331,113	4,134	90,58	134,78	4,89
25.0	6,837	5.8	330,769	7,162	89,10	134,82	6,50
30.0	6,857	48.6	330,118	11,742	86,20	134,81	8,35
35.0	6,930	135.3	329,082	17,601	81,99	134,67	10,37
37.0	6,982	184.0	328,537	20,255	79,98	134,57	11,25
37.0	6,982	184.2	328,534	20,269	79,97	134,57	11,25
38.6	7,036	218.0	328,037	22,495	78,30	134,46	12,05
39.0	7,050	224.5	327,914	23,020	77,91	134,43	12,24
39.2	7,057	228.2	327,849	23,290	77,71	134,42	12,34
40.0	7,088	244.2	327,586	24,369	76,90	134,35	12,75
45.0	7,330	344.5	325,704	30,978	71,97	133,84	15,55
50.0	7,658	454.2	323,299	37,364	67,18	133,18	18,86
55.0	8,083	583.1	320,164	43,530	62,46	132,39	22,84
60.0	8,625	738.5	316,009	49,428	57,82	131,46	27,84
65.0	9,306	921.5	310,448	54,929	53,80	130,08	34,79
70.0	10,148	1128.5	302,998	59,815	49,98	128,49	43,70
75.0	11,168	1353.8	293,240	63,790	46,47	126,70	54,99
76.2	11,439	1409.3	290,562	64,567	45,61	126,30	57,97
77.8	11,823	1461.3	286,727	65,503	44,48	125,75	62,22
80.0	12,358	1509.8	281,391	66,513	43,09	124,99	68,15
85.0	13,644	1614.1	268,958	67,809	40,43	123,18	82,03
90.0	15,013	1714.0	257,143	67,903	38,46	121,26	95,47
95.0	16,464	1813.6	246,799	67,086	36,95	119,33	107,47
96.0	16,765	1833.7	244,943	66,838	36,69	118,95	109,66
100.0	18,004	1931.8	238,211	65,630	35,79	117,44	117,70
105.0	19,645	2058.2	231,233	63,755	36,39	121,21	111,03
110.0	21,392	2186.0	225,524	61,670	37,85	125,45	102,93
115.0	23,243	2311.7	220,726	59,528	40,27	129,41	94,44
120.0	25,195	2432.7	216,860	57,426	43,54	133,56	86,23
125.0	27,247	2556.9	212,843	55,413	42,37	134,82	88,20
130.0	29,407	2694.4	209,477	53,481	41,19	136,87	89,94
135.0	31,686	2846.0	206,400	51,614	40,02	138,73	91,50
140.0	34,095	3011.9	203,572	49,804	38,86	140,43	92,91
145.0	36,646	3192.1	200,957	48,044	37,71	141,99	94,19

Table 4-6 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SOUTH VANDENBERG AIR FORCE BASE NASA T/M

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
150.0	39,352	3386.7	198,532	46,331	36,57	143,42	95,37
155.0	42,224	3596.3	196,274	44,665	35,46	144,71	96,45
160.0	45,275	3821.2	194,168	43,044	34,36	145,89	97,46
165.0	48,517	4061.8	192,198	41,467	33,29	146,94	98,42
170.0	51,964	4318.6	190,353	39,936	32,25	147,88	99,33
175.0	55,638	4592.0	188,628	38,449	31,24	148,70	100,22
180.0	59,527	4882.5	186,992	37,007	30,26	149,40	101,10
185.0	63,670	5190.8	185,459	35,610	29,31	149,98	101,97
190.0	68,075	5518.0	184,013	34,258	28,39	150,43	102,85
195.0	72,757	5865.4	182,648	32,950	27,50	150,76	103,76
200.0	77,734	6234.1	181,356	31,685	26,66	150,97	104,70
205.0	83,023	6625.5	180,133	30,462	25,84	151,04	105,69
210.0	88,645	7040.7	178,973	29,280	25,06	150,98	106,72
215.0	94,618	7481.0	177,871	28,139	24,32	150,79	107,82
220.0	100,964	7949.2	176,824	27,037	23,62	150,46	108,99
225.0	107,709	8448.7	175,826	25,972	22,95	150,00	110,23
230.0	114,879	8983.2	174,875	24,943	22,32	149,40	111,55
235.0	122,584	9556.3	173,965	23,948	21,73	148,66	112,95
240.0	130,618	10171.7	173,095	22,984	21,18	147,79	114,44
245.0	139,258	10834.5	172,261	22,050	20,66	146,79	116,02
250.0	148,464	11552.2	171,461	21,145	20,19	145,65	117,69
255.0	158,287	12333.1	170,691	20,266	19,75	144,40	119,44
260.0	168,783	13188.1	169,948	19,410	19,36	143,02	121,28
264.0	177,787	13983.9	169,373	18,741	19,07	141,84	122,80
265.0	180,016	14129.9	169,231	18,576	19,00	141,53	123,19
269.0	189,586	14954.9	168,674	17,922	18,74	140,27	124,77
269.6	190,967	15075.1	168,597	17,832	18,71	140,09	125,00
269.9	191,794	15100.3	168,551	17,778	18,64	140,15	124,95
269.9	191,799	15100.4	168,551	17,778	18,64	140,15	124,95
270.0	192,065	15101.1	168,537	17,761	18,62	140,16	124,94
275.0	204,585	15131.1	167,902	16,988	17,66	141,08	124,25
275.6	205,897	15134.0	167,836	16,906	17,56	141,19	124,16
277.6	210,879	15138.9	167,689	16,615	17,21	141,58	123,85
280.0	216,962	15143.6	167,346	16,272	16,81	142,07	123,45
281.6	220,848	15145.9	167,187	16,059	16,56	142,39	123,18
281.8	221,371	15146.1	167,166	16,030	16,52	142,43	123,15
281.9	221,596	15147.3	167,157	16,018	16,51	142,45	123,13
282.6	223,341	15161.8	167,088	15,924	16,40	142,60	123,01
283.6	225,838	15162.4	166,991	15,791	16,25	142,81	122,83
285.0	229,443	15211.9	166,855	15,603	16,10	142,80	122,90
290.0	242,004	15316.9	166,414	14,971	15,63	142,72	123,16

Table 4-6 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SOUTH VANDENBERG AIR FORCE BASE NASA T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
291.6	245,938	15349.3	166,285	14,780	15,50	142,69	123,25
300.0	267,382	15522.9	165,653	13,800	14,84	142,47	123,74
301.6	271,369	15554.8	165,547	13,627	14,73	142,42	123,84
310.0	293,098	15727.1	165,021	12,729	14,20	142,09	124,38
320.0	319,150	15932.6	164,485	11,737	13,68	141,61	125,10
330.0	345,543	16141.4	164,026	10,808	13,25	141,03	125,87
340.0	372,283	16355.0	163,626	9,930	12,91	140,36	126,71
350.0	399,380	16574.6	163,275	9,094	12,62	139,62	127,60
360.0	426,844	16801.1	162,963	8,294	12,39	138,81	128,54
370.0	454,686	17035.1	162,684	7,524	12,21	137,95	129,52
380.0	482,921	17277.5	162,433	6,781	12,06	137,05	130,53
390.0	511,562	17528.8	162,204	6,060	11,95	136,10	131,58
400.0	540,624	17789.8	161,994	5,358	11,87	135,13	132,64
410.0	570,124	18060.8	161,802	4,675	11,82	134,12	133,73
420.0	600,079	18342.8	161,623	4,007	11,79	133,10	134,83
430.0	630,507	18636.3	161,457	3,354	11,79	132,07	135,93
440.0	661,428	18942.1	161,302	2,713	11,80	131,03	137,04
450.0	692,863	19260.9	161,156	2,084	11,84	129,98	138,15
460.0	724,835	19593.6	161,018	1,466	11,89	128,93	139,25
470.0	757,366	19941.2	160,887	857	11,95	127,89	140,35
480.0	790,481	20304.7	160,763	258	12,04	126,85	141,43
490.0	824,210	20685.2	160,644	333	12,13	125,82	142,51
500.0	858,578	21083.6	160,530	916	12,24	124,81	143,57
510.0	893,619	21501.3	160,421	1,492	12,36	123,81	144,61
520.0	929,363	21939.8	160,315	2,061	12,50	122,82	145,63
521.6	935,001	22010.2	160,298	2,149	12,52	122,67	145,79
530.0	965,848	22400.5	160,212	2,623	12,64	121,85	146,63
540.0	1003,109	22884.6	160,112	3,180	12,80	120,90	147,61
550.0	1041,188	23393.0	160,015	3,731	12,96	119,97	148,57
560.0	1080,122	23925.1	159,920	4,277	13,14	119,06	149,51
561.0	1084,064	23979.5	159,911	4,331	13,15	118,97	149,60
562.0	1088,015	24034.3	159,901	4,389	13,17	118,88	149,70
563.0	1091,975	24089.2	159,892	4,439	13,19	118,79	149,79
564.0	1095,944	24144.4	159,882	4,494	13,21	118,71	149,88
565.0	1099,923	24199.7	159,873	4,548	13,23	118,62	149,97
566.0	1103,910	24255.4	159,864	4,602	13,24	118,53	150,06
567.0	1107,907	24311.2	159,855	4,656	13,26	118,44	150,15
568.0	1111,912	24367.3	159,845	4,710	13,28	118,35	150,24
569.0	1115,927	24423.6	159,836	4,764	13,30	118,26	150,34
570.0	1119,952	24480.1	159,827	4,817	13,32	118,17	150,43
571.0	1123,985	24536.9	159,818	4,871	13,34	118,09	150,52

Table 4-6 (Continued)

 AE-C SPACECRAFT MISSION
 RADAR PARAMETERS

SOUTH VANDENBERG AIR FORCE BASE NASA T/M

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
572.0	1128,028	24593.9	159,808	-4,925	13,36	118,00	150,61
573.0	1132,080	24651.1	159,799	-4,979	13,37	117,91	150,69
574.0	1136,142	24708.6	159,790	-5,032	13,39	117,82	150,76
575.0	1140,213	24766.3	159,781	-5,086	13,41	117,74	150,87
576.0	1144,294	24824.3	159,772	-5,140	13,43	117,65	150,96
577.0	1148,385	24882.6	159,763	-5,193	13,45	117,56	151,05
578.0	1152,485	24941.0	159,753	-5,247	13,47	117,48	151,14
579.0	1156,594	24999.8	159,744	-5,300	13,49	117,39	151,23
580.0	1160,713	25058.7	159,735	-5,353	13,51	117,31	151,32
581.0	1164,842	25118.0	159,726	-5,407	13,53	117,22	151,40
582.0	1168,981	25177.5	159,717	-5,460	13,55	117,14	151,49
583.0	1173,130	25237.2	159,708	-5,513	13,57	117,05	151,58
584.0	1177,288	25297.2	159,699	-5,566	13,59	116,97	151,67
585.0	1181,457	25357.4	159,690	-5,620	13,61	116,88	151,75
586.0	1185,635	25417.9	159,681	-5,673	13,63	116,80	151,84
587.0	1189,823	25478.6	159,672	-5,726	13,65	116,71	151,92
588.0	1194,021	25539.6	159,663	-5,779	13,67	116,63	152,01
589.0	1198,230	25600.8	159,654	-5,832	13,69	116,54	152,10
590.0	1202,448	25662.3	159,645	-5,885	13,71	116,46	152,18
591.0	1206,677	25724.0	159,636	-5,938	13,73	116,38	152,27
592.0	1210,915	25786.0	159,627	-5,990	13,75	116,29	152,35
593.0	1215,164	25848.2	159,619	-6,043	13,77	116,21	152,44
594.0	1219,424	25910.7	159,610	-6,096	13,79	116,13	152,52
595.0	1223,693	25973.5	159,601	-6,149	13,81	116,04	152,61
596.0	1227,973	26036.5	159,592	-6,201	13,83	115,96	152,69
597.0	1232,263	26099.8	159,583	-6,254	13,85	115,88	152,77
598.0	1236,564	26163.4	159,574	-6,307	13,87	115,80	152,86
599.0	1240,875	26227.3	159,565	-6,359	13,89	115,72	152,94
600.0	1245,197	26291.4	159,557	-6,412	13,91	115,63	153,03
601.0	1249,529	26355.8	159,548	-6,464	13,94	115,55	153,11
602.0	1253,872	26420.5	159,539	-6,517	13,96	115,47	153,19
603.0	1258,226	26485.5	159,530	-6,569	13,98	115,39	153,27
604.0	1262,590	26550.9	159,521	-6,621	14,00	115,31	153,36
605.0	1266,965	26616.5	159,513	-6,674	14,02	115,23	153,44
606.0	1271,351	26682.4	159,504	-6,726	14,04	115,15	153,52
607.0	1275,748	26748.7	159,495	-6,778	14,06	115,07	153,60
608.0	1280,156	26815.2	159,486	-6,830	14,08	114,99	153,68
609.0	1284,575	26882.1	159,478	-6,882	14,11	114,91	153,76
610.0	1289,004	26949.3	159,469	-6,934	14,13	114,83	153,84
611.1	1293,832	27022.8	159,460	-6,991	14,15	114,75	153,93
611.4	1295,367	27046.2	159,457	-7,009	14,16	114,72	153,96

Table 4-6 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SOUTH VANDENBERG AIR FORCE BASE NASA T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
611.4	1295,367	27046.2	159,457	-7,009	14,16	114,72	153,96
620.0	1333,501	27040.2	159,384	-7,449	13,72	115,22	153,43
630.0	1377,996	27030.6	159,306	-7,950	13,21	115,84	152,78
650.0	1466,928	27003.6	159,164	-8,916	12,26	117,23	151,33
660.0	1511,357	26986.4	159,100	-9,382	11,80	118,01	150,53
670.0	1555,755	26966.9	159,039	-9,839	17,40	144,79	122,95
690.0	1644,446	26921.4	158,929	-10,727	33,01	163,29	103,01
710.0	1732,974	26867.7	158,832	-11,585	49,92	169,35	95,68
730.0	1821,312	26806.2	158,744	-12,418	67,19	172,10	91,75
750.0	1909,435	26737.3	158,665	-13,228	84,60	173,53	89,18
760.0	1953,409	26700.3	158,629	-13,625	93,33	173,96	88,17
770.0	1997,321	26661.5	158,594	-14,019	93,30	174,37	88,14
790.0	2084,945	26579.0	158,528	-14,792	93,23	175,17	88,10
800.0	2128,653	26535.3	158,497	-15,173	93,20	175,57	88,08
900.0	2561,295	26016.2	158,244	-18,815	92,96	179,35	87,83
1000.0	2984,276	25363.3	158,050	-22,232	92,81	182,91	87,56
1100.0	3395,621	24606.0	157,878	-25,491	92,72	186,31	87,27
1200.0	3793,731	23760.7	157,708	-28,624	92,66	189,58	86,95
1300.0	4177,368	22850.6	157,528	-31,651	92,64	192,75	86,61
1375.7	4457,418	22131.1	157,379	-33,875	92,63	195,08	86,34
1400.0	4545,630	21895.3	157,328	-34,580	92,64	195,82	86,25
1410.0	4581,585	21798.0	157,307	-34,868	92,64	196,12	86,21
1420.0	4617,379	21700.4	157,285	-35,155	92,64	196,43	86,17
1430.0	4653,013	21602.5	157,263	-35,441	92,64	196,73	86,14
1440.0	4688,486	21504.5	157,240	-35,726	92,64	197,02	86,10
1450.0	4723,797	21406.2	157,218	-36,011	92,64	197,32	86,06
1455.0	4741,392	21356.9	157,206	-36,153	92,64	197,47	86,04
1460.0	4758,946	21307.7	157,195	-36,294	92,64	197,62	86,02
1465.0	4776,460	21258.4	157,183	-36,436	92,64	197,77	86,00
1470.0	4793,933	21209.0	157,171	-36,577	92,64	197,92	85,98
1475.0	4811,365	21159.6	157,160	-36,718	92,64	198,07	85,96
1480.0	4828,757	21110.1	157,148	-36,859	92,65	198,21	85,94
1485.0	4846,108	21060.6	157,136	-36,999	92,65	198,36	85,92
1490.0	4863,418	21011.1	157,124	-37,139	92,65	198,51	85,90
1495.0	4880,688	20961.5	157,112	-37,280	92,65	198,66	85,88
1495.7	4882,937	20955.1	157,110	-37,298	92,65	198,68	85,87
1500.0	4897,917	20911.9	157,100	-37,419	92,65	198,80	85,86
1505.0	4915,105	20862.3	157,087	-37,559	92,65	198,95	85,84
1510.0	4932,252	20812.6	157,075	-37,699	92,65	199,10	85,82
1515.0	4949,358	20762.9	157,063	-37,838	92,65	199,24	85,80
1520.0	4966,423	20713.2	157,050	-37,977	92,65	199,39	85,77

Table 4-6 (Concluded)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SOUTH VANDENBERG AIR FORCE BASE NASA T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
1525.0	4983,447	20663.5	157,037	-38,116	92,66	199,54	85,75
1530.0	5000,431	20613.7	157,025	-38,254	92,66	199,68	85,73
1535.0	5017,373	20563.9	157,012	-38,393	92,66	199,83	85,71
1540.0	5034,275	20514.1	156,999	-38,531	92,66	199,97	85,69
1545.0	5051,135	20464.2	156,986	-38,669	92,66	200,12	85,67
1550.0	5067,955	20414.4	156,973	-38,807	92,66	200,26	85,65
1650.0	5395,712	19415.2	156,690	-41,520	92,70	203,12	85,20
1750.0	5707,038	18419.0	156,362	-44,152	92,74	205,90	84,72
1850.0	6002,051	17434.0	155,982	-46,709	92,79	208,61	84,19
1950.0	6280,986	16465.9	155,543	-49,192	92,85	211,24	83,61
2050.0	6544,158	15519.0	155,034	-51,604	92,92	213,81	82,96
2062.3	6575,376	15404.4	154,867	-51,896	92,92	214,12	82,88
2150.0	6791,938	14595.9	154,446	-53,949	92,99	216,32	82,25
2250.0	7024,732	13698.0	153,767	-56,229	93,06	218,76	81,45
2350.0	7242,963	12826.2	152,979	-58,447	93,14	221,16	80,55
2450.0	7447,059	11980.3	152,065	-60,604	93,23	223,50	79,53
2550.0	7637,443	11159.6	151,001	-62,702	93,32	225,79	78,37
2636.1	7790,685	10473.1	149,942	-64,462	93,39	227,72	77,24
2650.0	7814,527	10363.9	149,757	-64,742	93,41	228,03	77,04
2750.0	7978,708	9591.5	148,295	-66,724	93,50	230,24	75,50
2850.0	8130,363	8841.4	146,565	-68,648	93,60	232,40	73,71
2908.9	8214,012	8409.2	145,395	-69,753	93,66	233,66	72,50
2950.0	8269,846	8112.2	144,503	-70,510	93,70	234,53	71,59
3050.0	8397,490	7402.5	142,022	-72,308	93,80	236,62	69,86
3150.0	8513,605	6711.0	139,007	-74,033	93,91	238,68	66,01
3250.0	8618,478	6036.1	135,304	-75,675	94,02	240,72	62,28
3350.0	8712,374	5376.7	130,789	-77,216	94,13	242,73	57,67
3450.0	8795,533	4731.2	124,957	-78,632	94,25	244,71	51,91
3550.0	8868,176	4098.6	117,738	-79,883	94,37	246,68	44,70
3650.0	8930,504	3477.4	108,764	-80,916	94,49	248,62	36,74
3750.0	8982,695	2866.6	97,936	-81,666	94,62	250,55	24,95
3850.0	9024,911	2264.9	85,620	-82,062	94,75	252,46	12,67
3950.0	9057,292	1671.4	72,769	-82,065	94,89	254,36	359,88
4050.0	9079,963	1084.8	60,594	-81,683	95,02	256,25	347,77
4150.0	9093,632	504.2	49,972	-80,970	95,17	258,13	337,23
4250.0	9096,588	-71.3	41,186	-80,083	95,31	260,00	328,54
4350.0	9090,706	-642.8	34,096	-78,851	95,47	261,87	321,56
4450.0	9075,446	-1211.2	28,400	-77,568	95,63	263,74	315,99
4550.0	9050,851	-1777.3	23,794	-76,190	95,79	265,60	311,53
4602.3	9034,267	-2073.0	21,729	-75,441	95,88	266,57	309,55

Table 4-7

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

VAANDENBERG AIR FORCE BASE T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
0.0	12,873	=.0	332,242	=2.124	90.00	0.00	0.00
2.0	12,873	=.5	332,242	=2.114	91.90	197.33	.01
5.0	12,873	=1.5	332,242	=2.048	91.83	183.73	.01
10.0	12,871	=3.3	332,241	=1.741	91.51	161.07	.03
15.0	12,865	=12.7	332,227	=1.076	94.81	138.60	4.18
16.0	12,863	=17.0	332,217	=.889	95.50	134.12	4.81
20.0	12,846	=33.5	332,138	.075	94.61	134.12	4.82
20.5	12,843	=35.1	332,124	.222	94.46	134.13	4.82
25.0	12,812	=47.6	331,944	1.830	94.42	134.28	6.39
30.0	12,770	=52.3	331,608	4.277	93.70	134.43	8.15
35.0	12,731	=38.2	331,079	7.458	92.22	134.55	9.94
37.0	12,721	=25.4	330,804	8.928	91.41	134.58	10.68
37.0	12,721	=25.3	330,802	8.936	91.41	134.58	10.68
38.6	12,716	=11.5	330,553	10.188	90.74	134.60	11.32
39.0	12,715	=8.3	330,492	10.486	90.58	134.60	11.48
39.2	12,715	=6.6	330,460	10.640	90.49	134.60	11.56
40.0	12,715	=.1	330,329	11.257	90.16	134.60	11.88
45.0	12,731	41.2	329,406	15.165	88.02	134.88	13.96
50.0	12,784	88.1	328,259	19.206	85.70	134.49	16.17
55.0	12,880	148.5	326,809	23.450	83.08	134.34	18.53
60.0	13,035	231.4	324,953	27.956	80.12	134.12	21.18
65.0	13,269	343.1	322,555	32.742	77.23	133.71	24.70
70.0	13,608	488.2	319,430	37.799	73.95	133.15	28.82
75.0	14,082	669.5	315,355	42.877	70.34	132.43	33.80
76.2	14,218	717.9	314,216	44.089	69.36	132.26	35.08
77.8	14,418	774.0	312,556	45.717	68.03	132.01	36.92
80.0	14,708	838.9	310,162	47.809	66.29	131.66	39.57
85.0	15,458	983.8	303,975	52.099	62.55	130.75	46.40
90.0	16,326	1125.2	296,736	55.636	59.25	129.68	54.44
95.0	17,310	1265.1	288,474	58.337	56.27	128.50	63.58
96.0	17,520	1293.1	286,714	58.772	55.71	128.25	65.53
100.0	18,412	1417.8	279,377	60.149	53.59	127.23	73.62
105.0	19,644	1574.0	269,814	61.068	53.79	125.71	73.32
110.0	21,002	1726.8	260,322	61.197	54.19	125.15	72.35
115.0	22,484	1874.5	251,344	60.706	55.01	123.26	70.54
120.0	24,085	2016.4	243,128	59.775	56.36	122.69	67.87
125.0	25,803	2161.1	235,742	58.556	54.06	122.14	73.37
130.0	27,646	2318.7	229,149	57.127	51.85	130.42	78.14
135.0	29,623	2490.0	223,279	55.543	49.72	132.53	82.26
140.0	31,747	2675.3	218,056	53.852	47.68	134.51	85.80
145.0	34,030	2874.6	213,401	52.092	45.72	136.34	88.83

Table 4-7 (Continued)

AE-C SPACECRAFT MISSION RADAR PARAMETERS

VANDENBERG AIR FORCE BASE T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
150.0	36,482	3088.0	209,242	50,295	43,84	138,06	91,43
155.0	39,116	3316.0	205,513	48,484	42,04	139,64	93,66
160.0	41,944	3558.8	202,157	46,680	40,33	141,11	95,60
165.0	44,977	3816.7	199,125	44,896	38,69	142,46	97,28
170.0	48,229	4090.1	196,374	43,145	37,13	143,68	98,77
175.0	51,713	4379.4	193,869	41,435	35,65	144,78	100,10
180.0	55,442	4685.1	191,579	39,772	34,25	145,76	101,30
185.0	59,428	5007.8	189,477	38,160	32,91	146,60	102,42
190.0	63,688	5348.6	187,542	36,602	31,65	147,32	103,48
195.0	68,236	5708.6	185,754	35,098	30,45	147,91	104,50
200.0	73,089	6089.2	184,097	33,650	29,32	148,36	105,50
205.0	78,264	6491.6	182,556	32,287	28,25	148,67	106,52
210.0	83,779	6917.2	181,119	30,917	27,25	148,84	107,55
215.0	89,655	7367.0	179,775	29,630	26,30	148,87	108,62
220.0	95,911	7844.0	178,516	28,394	25,41	148,75	109,74
225.0	102,573	8351.7	177,333	27,206	24,57	148,48	110,92
230.0	109,666	8893.7	176,218	26,064	23,79	148,07	112,17
235.0	117,220	9473.7	175,165	24,966	23,06	147,52	113,50
240.0	125,269	10095.5	174,167	23,909	22,38	146,81	114,90
245.0	133,848	10764.1	173,220	22,890	21,75	145,97	116,40
250.0	143,000	11487.1	172,319	21,908	21,17	144,98	117,98
255.0	152,771	12273.0	171,460	20,958	20,64	143,86	119,65
260.0	163,219	13132.5	170,638	20,038	20,15	142,61	121,41
264.0	172,107	13881.6	170,085	19,323	19,80	141,52	123,87
265.0	174,408	14078.3	169,650	19,146	19,72	141,24	123,25
269.0	183,945	14906.4	169,241	18,450	19,40	140,06	124,78
269.6	185,322	15026.9	169,158	18,354	19,35	139,89	124,99
269.9	186,146	15052.6	169,108	18,297	19,28	139,95	124,95
269.9	186,151	15052.7	169,108	18,296	19,28	139,95	124,95
270.0	186,416	15053.6	169,092	18,278	19,26	139,92	124,94
275.0	198,819	15090.4	168,403	17,460	18,24	140,88	124,27
275.6	200,208	15093.9	168,332	17,372	18,13	140,99	124,19
277.6	205,177	15101.1	168,085	17,065	17,76	141,35	123,89
280.0	211,246	15108.4	167,802	16,703	17,32	141,07	123,50
281.6	215,123	15112.1	167,629	16,479	17,06	142,19	123,23
281.8	215,645	15112.6	167,607	16,449	17,02	142,24	123,20
281.9	215,869	15113.9	167,597	16,436	17,01	142,25	123,18
282.6	217,611	15128.9	167,522	16,337	16,89	142,40	123,06
283.6	220,102	15150.4	167,418	16,197	16,73	142,61	122,88
285.0	223,699	15181.0	167,271	15,999	16,57	142,61	122,95
290.0	236,236	15289.6	166,797	15,337	16,06	142,57	123,20

Table 4-7 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

VANDENBERG AIR FORCE BASE T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
291.6	240,164	15323.0	166,659	15,138	15,91	142,55	123,28
300.0	261,575	15501.1	165,983	14,116	15,20	142,38	123,73
301.6	265,556	15533.7	165,870	13,936	15,08	142,34	123,82
310.0	287,258	15709.5	165,309	13,009	14,50	142,07	124,34
320.0	313,284	15918.1	164,741	11,980	13,94	141,63	125,01
330.0	338,655	16129.3	164,255	11,034	13,48	141,10	125,75
340.0	366,377	16345.0	163,834	10,123	13,10	140,47	126,55
350.0	393,459	16566.2	163,464	9,269	12,79	139,77	127,41
360.0	420,910	16794.1	163,138	8,453	12,54	139,00	128,32
370.0	448,742	17029.4	162,846	7,669	12,33	138,17	129,28
380.0	476,968	17272.8	162,583	6,914	12,17	137,28	130,27
390.0	505,602	17525.0	162,344	6,182	12,05	136,36	131,30
400.0	534,658	17786.7	162,126	5,472	11,95	135,40	132,35
410.0	564,154	18058.6	161,926	4,781	11,89	134,41	133,43
420.0	594,106	18341.1	161,741	4,106	11,85	133,40	134,52
430.0	624,532	18635.3	161,569	3,447	11,84	132,37	135,62
440.0	655,452	18941.7	161,408	2,801	11,84	131,33	136,72
450.0	686,887	19261.0	161,257	2,167	11,87	130,28	137,83
460.0	718,859	19594.2	161,115	1,544	11,91	129,24	138,94
470.0	751,391	19942.2	160,980	,932	11,97	128,19	140,04
480.0	784,509	20306.2	160,852	,329	12,05	127,15	141,13
490.0	818,240	20687.0	160,730	,265	12,14	126,12	142,20
500.0	852,612	21085.9	160,613	,851	12,25	125,10	143,27
510.0	887,656	21504.0	160,500	1,429	12,36	124,09	144,32
520.0	923,405	21942.8	160,392	2,001	12,49	123,10	145,35
521.6	929,044	22013.2	160,375	2,089	12,51	122,95	145,51
530.0	959,895	22403.8	160,287	2,565	12,63	122,13	146,36
540.0	997,162	22888.3	160,184	3,123	12,78	121,17	147,35
550.0	1035,247	23397.0	160,085	3,676	12,94	120,23	148,32
560.0	1074,188	23929.4	159,988	4,233	13,12	119,31	149,26
561.0	1078,131	23983.9	159,978	4,278	13,13	119,22	149,36
562.0	1082,083	24038.6	159,969	4,332	13,15	119,13	149,45
563.0	1086,044	24093.6	159,959	4,386	13,17	119,04	149,54
564.0	1090,014	24148.8	159,950	4,441	13,19	118,95	149,64
565.0	1093,992	24204.2	159,940	4,495	13,20	118,86	149,73
566.0	1097,981	24259.8	159,931	4,549	13,22	118,77	149,82
567.0	1101,978	24315.7	159,921	4,603	13,24	118,68	149,91
568.0	1105,984	24371.8	159,912	4,657	13,26	118,59	150,00
569.0	1110,000	24428.1	159,902	4,711	13,28	118,50	150,10
570.0	1114,025	24484.7	159,893	4,765	13,30	118,41	150,19
571.0	1118,059	24541.5	159,883	4,819	13,31	118,32	150,28

Table 4-7 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

VANDENBERG AIR FORCE BASE T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
572.0	1122,103	24598.5	159,874	-4,873	13,33	118,23	150,37
573.0	1126,156	24655.8	159,865	-4,927	13,35	118,15	150,46
574.0	1130,219	24713.3	159,855	-4,980	13,37	118,06	150,55
575.0	1134,291	24771.1	159,846	-5,034	13,39	117,97	150,64
576.0	1138,372	24829.1	159,837	-5,088	13,41	117,88	150,73
577.0	1142,464	24887.4	159,827	-5,141	13,43	117,80	150,82
578.0	1146,564	24945.9	159,818	-5,195	13,44	117,71	150,91
579.0	1150,675	25004.6	159,809	-5,249	13,46	117,62	151,00
580.0	1154,795	25063.6	159,799	-5,302	13,48	117,53	151,09
581.0	1158,925	25122.9	159,790	-5,355	13,50	117,45	151,17
582.0	1163,064	25182.4	159,781	-5,409	13,52	117,36	151,26
583.0	1167,214	25242.2	159,772	-5,462	13,54	117,28	151,35
584.0	1171,373	25302.2	159,763	-5,515	13,56	117,19	151,44
585.0	1175,542	25362.5	159,753	-5,569	13,58	117,10	151,53
586.0	1179,721	25423.0	159,744	-5,622	13,60	117,02	151,61
587.0	1183,910	25483.7	159,735	-5,675	13,62	116,93	151,70
588.0	1188,109	25544.7	159,726	-5,728	13,64	116,85	151,79
589.0	1192,319	25605.9	159,717	-5,781	13,66	116,76	151,88
590.0	1196,538	25667.4	159,708	-5,834	13,68	116,68	151,96
591.0	1200,767	25729.2	159,699	-5,887	13,70	116,59	152,05
592.0	1205,007	25791.2	159,690	-5,940	13,72	116,51	152,13
593.0	1209,257	25853.5	159,681	-5,993	13,74	116,43	152,22
594.0	1213,517	25916.0	159,672	-6,046	13,76	116,34	152,31
595.0	1217,787	25978.8	159,662	-6,099	13,78	116,26	152,39
596.0	1222,068	26041.9	159,653	-6,151	13,80	116,18	152,48
597.0	1226,359	26105.2	159,644	-6,204	13,82	116,09	152,56
598.0	1230,661	26168.8	159,635	-6,257	13,84	116,01	152,65
599.0	1234,973	26232.7	159,626	-6,309	13,86	115,93	152,73
600.0	1239,295	26296.9	159,617	-6,362	13,88	115,84	152,81
601.0	1243,629	26361.3	159,609	-6,415	13,90	115,76	152,90
602.0	1247,972	26426.0	159,600	-6,467	13,93	115,68	152,98
603.0	1252,327	26491.1	159,591	-6,520	13,95	115,60	153,07
604.0	1256,692	26556.4	159,582	-6,572	13,97	115,52	153,15
605.0	1261,068	26622.1	159,573	-6,624	13,99	115,44	153,23
606.0	1265,455	26688.0	159,564	-6,677	14,01	115,35	153,31
607.0	1269,853	26754.3	159,555	-6,729	14,03	115,27	153,40
608.0	1274,261	26820.9	159,546	-6,781	14,05	115,19	153,48
609.0	1278,681	26887.8	159,537	-6,833	14,07	115,11	153,56
610.0	1283,112	26955.0	159,528	-6,886	14,10	115,03	153,64
611.1	1287,941	27028.5	159,519	-6,942	14,12	114,95	153,73
611.4	1289,476	27051.9	159,516	-6,960	14,13	114,92	153,76

Table 4-7 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

VANDENBERG AIR FORCE BASE T/M

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
611.4	1289,476	27051.9	159,516	-6,960	14,13	114,92	153,76
620.0	1327,618	27046.1	159,442	-7,401	13,68	115,42	153,23
630.0	1372,123	27036.6	159,362	-7,903	13,18	116,05	152,57
650.0	1461,075	27009.9	159,218	-8,869	12,22	117,45	151,11
660.0	1505,514	26992.8	159,153	-9,335	11,76	118,24	150,30
670.0	1548,923	26973.5	159,092	-9,792	17,39	144,98	123,76
690.0	1638,636	26928.2	158,980	-10,681	33,02	163,39	102,92
710.0	1727,187	26874.6	158,881	-11,539	49,93	169,42	95,63
730.0	1815,548	26813.3	158,792	-12,371	67,21	172,16	91,72
750.0	1903,695	26744.7	158,712	-13,181	84,62	173,59	89,17
760.0	1947,681	26707.7	158,675	-13,579	93,35	174,02	88,16
770.0	1991,605	26669.0	158,639	-13,972	93,32	174,42	88,14
790.0	2079,255	26586.7	158,573	-14,746	93,25	175,23	88,10
800.0	2122,975	26543.1	158,542	-15,127	93,22	175,62	88,08
900.0	2555,752	26024.6	158,285	-18,768	92,97	179,40	87,83
1000.0	2978,880	25374.6	158,088	-22,183	92,82	182,96	87,56
1100.0	3390,384	24616.0	157,914	-25,441	92,73	186,36	87,26
1200.0	3788,663	23771.2	157,744	-28,673	92,67	189,63	86,95
1300.0	4172,477	22861.6	157,562	-31,599	92,65	192,80	86,61
1375.7	4452,666	22142.4	157,412	-33,823	92,64	195,13	86,34
1400.0	4540,923	21906.7	157,361	-34,527	92,64	195,87	86,25
1410.0	4576,897	21809.4	157,339	-34,815	92,64	196,17	86,21
1420.0	4612,711	21711.9	157,317	-35,102	92,65	196,47	86,17
1430.0	4648,363	21614.4	157,295	-35,388	92,65	196,77	86,13
1440.0	4683,855	21516.0	157,273	-35,673	92,65	197,07	86,09
1450.0	4719,185	21417.8	157,250	-35,958	92,65	197,37	86,05
1455.0	4736,789	21368.5	157,239	-36,099	92,65	197,52	86,04
1460.0	4754,353	21319.3	157,227	-36,241	92,65	197,67	86,02
1465.0	4771,877	21270.0	157,216	-36,382	92,65	197,82	86,00
1470.0	4789,359	21220.6	157,204	-36,523	92,65	197,96	85,98
1475.0	4806,801	21171.2	157,192	-36,664	92,65	198,11	85,96
1480.0	4824,203	21121.8	157,180	-36,805	92,65	198,26	85,94
1485.0	4841,563	21072.3	157,168	-36,946	92,65	198,41	85,92
1490.0	4858,883	21022.8	157,156	-37,086	92,66	198,56	85,90
1495.0	4876,163	20973.3	157,144	-37,226	92,66	198,70	85,87
1495.7	4878,413	20966.8	157,142	-37,244	92,66	198,72	85,87
1500.0	4893,401	20923.7	157,132	-37,366	92,66	198,85	85,85
1505.0	4910,599	20874.1	157,119	-37,506	92,66	199,00	85,83
1510.0	4927,755	20824.4	157,107	-37,645	92,66	199,14	85,81
1515.0	4944,871	20774.7	157,094	-37,784	92,66	199,29	85,79
1520.0	4961,946	20725.0	157,082	-37,923	92,66	199,44	85,77

Table 4-7 (Concluded)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

VANDENBERG AIR FORCE BASE T/M

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
1525.0	4978,980	20675.3	157,069	-38,062	92,66	199,58	85,75
1530.0	4995,973	20625.5	157,056	-38,201	92,66	199,73	85,73
1535.0	5012,925	20575.7	157,044	-38,339	92,67	199,87	85,71
1540.0	5029,837	20525.9	157,031	-38,477	92,67	200,02	85,69
1545.0	5046,707	20476.1	157,018	-38,615	92,67	200,16	85,67
1550.0	5063,536	20426.2	157,005	-38,753	92,67	200,31	85,65
1650.0	5391,491	19427.3	156,721	-41,465	92,70	203,17	85,20
1750.0	5703,017	18431.3	156,393	-44,097	92,75	205,94	84,72
1850.0	5998,234	17446.4	156,012	-46,653	92,80	208,65	84,19
1950.0	6277,373	16478.4	155,573	-49,135	92,86	211,29	83,61
2050.0	6540,750	15531.5	155,064	-51,548	92,92	213,85	82,96
2062.3	6571,993	15416.9	154,697	-51,839	92,93	214,16	82,88
2150.0	6788,736	14608.4	154,477	-53,892	92,99	216,36	82,25
2250.0	7021,735	13710.5	153,797	-56,172	93,07	218,81	81,45
2350.0	7246,171	12830.6	153,011	-58,389	93,15	221,20	80,55
2450.0	7444,471	11992.6	152,098	-60,545	93,23	223,54	79,53
2550.0	7635,058	11172.1	151,036	-62,643	93,32	225,83	78,38
2636.1	7788,474	10485.4	149,680	-64,403	93,40	227,76	77,25
2650.0	7812,344	10376.1	149,795	-64,683	93,41	228,07	77,05
2750.0	7976,725	9603.6	148,337	-66,665	93,51	230,28	75,52
2850.0	8128,578	8853.4	146,613	-68,588	93,61	232,44	73,73
2908.9	8212,344	8421.2	145,447	-69,694	93,67	233,70	72,53
2950.0	8268,258	8124.1	144,558	-70,451	93,71	234,57	71,62
3050.0	8396,097	7414.3	142,088	-72,249	93,81	236,66	69,10
3150.0	8512,405	6722.6	139,089	-73,974	93,92	238,72	66,07
3250.0	8617,470	6047.7	135,407	-75,617	94,03	240,76	62,36
3350.0	8711,554	5388.1	130,841	-77,160	94,14	242,77	57,78
3450.0	8794,901	4742.6	125,130	-78,578	94,26	244,75	52,06
3550.0	8867,731	4109.8	117,967	-79,833	94,38	246,72	44,91
3650.0	8930,243	3488.6	109,063	-80,872	94,50	248,66	36,02
3750.0	8982,616	2877.6	98,312	-81,630	94,63	250,59	25,30
3850.0	9025,012	2275.9	86,061	-82,039	94,76	252,50	13,09
3950.0	9057,572	1682.2	73,238	-82,055	94,89	254,40	33
4050.0	9080,421	1095.5	61,049	-81,686	95,03	256,29	348,21
4150.0	9093,666	514.9	50,384	-80,985	95,17	258,17	337,62
4250.0	9097,396	-60.8	41,544	-80,027	95,32	260,04	328,88
4350.0	9091,687	-632.4	34,401	-78,883	95,47	261,91	321,85
4450.0	9076,599	-1200.8	28,661	-77,605	95,63	263,77	316,24
4550.0	9052,175	-1767.9	24,018	-76,231	95,80	265,63	311,74
4602.3	9035,679	-2062.7	21,936	-75,484	95,88	266,61	309,74

Table 4-8

AE-C SPACECRAFT MISSION RADAR PARAMETERS

SANTIAGO, CHILE

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
0.0	4523,952	.0	320,393	-41,247	90,00	0,00	0,00
2.0	4523,954	9.9	320,393	-41,247	48,76	210,01	359,70
5.0	4523,964	30.9	320,393	-41,247	48,75	196,40	359,71
10.0	4524,009	83.5	320,393	-41,246	48,74	173,72	359,73
15.0	4524,106	155.0	320,393	-41,245	51,88	147,05	5,97
16.0	4524,133	176.3	320,392	-41,244	52,75	141,93	6,93
20.0	4524,267	237.8	320,392	-41,242	52,74	141,93	6,94
20.5	4524,287	247.1	320,392	-41,242	52,73	141,93	6,95
25.0	4524,502	334.4	320,391	-41,238	54,10	140,65	9,11
30.0	4524,818	433.7	320,390	-41,233	55,66	139,32	11,43
35.0	4525,214	526.7	320,388	-41,225	57,27	138,10	13,66
37.0	4525,392	560.4	320,386	-41,222	57,91	137,63	14,52
37.0	4525,393	560.6	320,386	-41,222	57,92	137,63	14,53
38.6	4525,542	558.4	320,385	-41,219	58,49	137,24	15,27
39.0	4525,578	554.3	320,385	-41,218	58,62	137,15	15,45
39.2	4525,596	553.2	320,385	-41,218	58,69	137,10	15,54
40.0	4525,669	551.3	320,384	-41,216	58,98	136,92	15,90
45.0	4526,118	541.5	320,381	-41,207	60,78	135,81	18,12
50.0	4526,562	538.8	320,376	-41,197	62,61	134,79	20,26
55.0	4527,007	543.9	320,370	-41,187	64,44	133,89	22,30
60.0	4527,459	555.1	320,364	-41,175	66,29	133,07	24,28
65.0	4527,920	566.6	320,355	-41,162	68,66	132,15	26,67
70.0	4528,390	572.4	320,345	-41,148	71,06	131,35	28,98
75.0	4528,860	560.3	320,333	-41,132	73,48	130,67	31,23
76.2	4528,971	565.5	320,330	-41,128	73,98	130,54	31,69
77.8	4529,120	551.7	320,325	-41,122	74,67	130,37	32,31
80.0	4529,314	524.9	320,319	-41,115	75,60	130,15	33,14
85.0	4529,720	461.0	320,303	-41,097	77,73	129,72	35,01
90.0	4530,071	392.4	320,286	-41,080	79,96	129,34	36,92
95.0	4530,364	318.1	320,268	-41,062	82,21	129,64	38,81
96.0	4530,415	302.5	320,264	-41,058	82,66	128,99	39,18
100.0	4530,594	239.5	320,247	-41,043	84,46	128,82	40,67
105.0	4530,754	147.0	320,225	-41,025	89,28	122,18	33,88
110.0	4530,831	35.0	320,201	-41,005	93,24	115,01	26,55
115.0	4530,808	-93.0	320,176	-40,984	96,22	107,36	18,75
120.0	4530,675	-231.0	320,150	-40,962	98,18	99,33	10,58
125.0	4530,426	-374.0	320,123	-40,939	99,16	99,37	10,76
130.0	4530,058	-521.4	320,096	-40,914	100,21	99,42	10,95
135.0	4529,567	-674.0	320,069	-40,888	101,26	99,47	11,13
140.0	4528,947	-832.2	320,041	-40,861	102,31	99,52	11,32
145.0	4528,195	-996.5	320,012	-40,832	103,36	99,57	11,51

Table 4-8 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SANTIAGO, CHILE

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
150.0	4527,305	-1167.4	319,983	-40,801	104,40	99,63	11,70
155.0	4526,272	-1345.3	319,953	-40,768	105,44	99,70	11,90
160.0	4525,089	-1530.8	319,922	-40,734	106,48	99,76	12,09
165.0	4523,750	-1724.3	319,890	-40,698	107,52	99,84	12,29
170.0	4522,249	-1926.5	319,857	-40,660	108,56	99,91	12,49
175.0	4520,577	-2137.8	319,824	-40,619	109,59	99,99	12,69
180.0	4518,728	-2358.8	319,789	-40,577	110,62	100,08	12,90
185.0	4516,692	-2590.1	319,753	-40,532	111,65	100,17	13,11
190.0	4514,462	-2832.9	319,716	-40,485	112,67	100,26	13,32
195.0	4512,027	-3088.0	319,678	-40,435	113,70	100,36	13,53
200.0	4509,376	-3356.6	319,639	-40,383	114,71	100,47	13,75
205.0	4506,498	-3639.6	319,599	-40,327	115,73	100,58	13,97
210.0	4503,382	-3938.0	319,557	-40,269	116,74	100,69	14,20
215.0	4500,013	-4252.6	319,513	-40,208	117,75	100,82	14,42
220.0	4496,378	-4585.8	319,468	-40,143	118,75	100,94	14,66
225.0	4492,460	-4940.4	319,422	-40,075	119,75	101,08	14,90
230.0	4488,240	-5318.8	319,373	-40,003	120,75	101,22	15,14
235.0	4483,699	-5723.7	319,323	-39,926	121,74	101,37	15,38
240.0	4478,812	-6157.7	319,271	-39,846	122,72	101,52	15,64
245.0	4473,556	-6624.2	319,216	-39,761	123,70	101,68	15,89
250.0	4467,900	-7129.0	319,159	-39,670	124,67	101,85	16,16
255.0	4461,811	-7678.0	319,100	-39,574	125,64	102,03	16,43
260.0	4455,249	-8279.0	319,038	-39,472	126,60	102,22	16,70
264.0	4449,628	-8883.4	318,986	-39,385	127,56	102,37	16,93
265.0	4448,168	-8941.3	318,973	-39,363	127,55	102,41	16,98
269.0	4442,094	-9522.0	318,918	-39,271	128,30	102,57	17,21
269.6	4441,214	-9606.6	318,911	-39,257	128,41	102,60	17,24
269.9	4440,687	-9626.7	318,906	-39,249	128,40	102,60	17,24
269.9	4440,663	-9626.8	318,906	-39,249	128,40	102,60	17,24
270.0	4440,514	-9628.4	318,904	-39,247	128,39	102,60	17,24
275.0	4432,560	-9703.8	318,834	-39,128	128,25	102,61	17,23
275.6	4431,667	-9712.2	318,827	-39,114	128,24	102,61	17,22
277.6	4428,465	-9739.4	318,798	-39,067	128,18	102,62	17,22
280.0	4424,546	-9772.5	318,764	-39,009	128,11	102,63	17,21
281.6	4422,036	-9793.7	318,742	-38,972	128,07	102,63	17,20
281.8	4421,697	-9796.6	318,739	-38,967	128,06	102,64	17,20
281.9	4421,552	-9798.5	318,738	-38,965	128,06	102,64	17,20
282.6	4420,422	-9816.8	318,728	-38,949	128,04	102,64	17,20
283.6	4418,804	-9842.9	318,714	-38,925	128,01	102,64	17,20
285.0	4416,466	-9880.6	318,694	-38,891	128,09	102,67	17,23
290.0	4408,280	-10014.5	318,623	-38,773	128,39	102,75	17,32

Table 4-8 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SANTIAGO, CHILE

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
291.6	4405,705	-10056.4	318,601	-38,736	128,43	102,78	17,35
300.0	4391,576	-10284.7	318,480	-38,537	128,86	102,94	17,92
301.6	4388,932	-10327.1	318,457	-38,500	128,94	102,96	17,56
310.0	4374,425	-10558.4	318,334	-38,300	129,38	103,12	17,73
320.0	4356,820	-10835.8	318,187	-38,063	129,89	103,31	17,94
330.0	4338,756	-11117.2	318,038	-37,825	130,40	103,51	18,15
340.0	4320,225	-11402.8	317,886	-37,586	130,91	103,72	18,38
350.0	4301,220	-11693.0	317,733	-37,346	131,42	103,93	18,60
360.0	4281,734	-11987.9	317,576	-37,105	131,92	104,14	18,83
370.0	4261,758	-12287.9	317,418	-36,863	132,42	104,37	19,07
380.0	4241,284	-12593.1	317,256	-36,619	132,92	104,60	19,32
390.0	4220,364	-12904.0	317,092	-36,374	133,42	104,84	19,57
400.0	4198,807	-13220.9	316,925	-36,127	133,91	105,08	19,83
410.0	4176,783	-13544.2	316,755	-35,878	134,39	105,34	20,09
420.0	4154,221	-13874.2	316,581	-35,627	134,88	105,60	20,36
430.0	4131,111	-14211.5	316,405	-35,373	135,35	105,87	20,64
440.0	4107,439	-14556.5	316,225	-35,117	135,83	106,15	20,93
450.0	4083,192	-14909.8	316,041	-34,858	136,29	106,44	21,23
460.0	4058,357	-15272.0	315,853	-34,596	136,76	106,74	21,53
470.0	4032,918	-15643.7	315,662	-34,330	137,21	107,04	21,84
480.0	4006,858	-16025.9	315,466	-34,061	137,66	107,36	22,16
490.0	3980,161	-16419.0	315,265	-33,788	138,11	107,68	22,49
500.0	3952,807	-16823.9	315,060	-33,510	138,54	108,02	22,83
510.0	3924,777	-17241.6	314,850	-33,228	138,97	108,37	23,17
520.0	3896,048	-17673.0	314,634	-32,940	139,39	108,72	23,53
521.6	3891,504	-17741.6	314,600	-32,895	139,45	108,78	23,59
530.0	3866,597	-18119.1	314,413	-32,647	139,80	109,09	23,89
540.0	3836,399	-18580.9	314,186	-32,348	140,20	109,47	24,27
550.0	3805,427	-19058.7	313,952	-32,042	140,59	109,86	24,65
560.0	3773,657	-19551.8	313,711	-31,729	140,97	110,27	25,05
561.0	3770,435	-19601.9	313,687	-31,697	141,00	110,31	25,09
562.0	3767,205	-19652.2	313,662	-31,665	141,04	110,35	25,13
563.0	3763,966	-19702.6	313,638	-31,633	141,08	110,39	25,17
564.0	3760,720	-19753.2	313,613	-31,601	141,11	110,43	25,21
565.0	3757,464	-19803.9	313,588	-31,569	141,15	110,47	25,25
566.0	3754,201	-19854.7	313,564	-31,537	141,19	110,51	25,29
567.0	3750,929	-19905.7	313,539	-31,505	141,22	110,55	25,33
568.0	3747,649	-19956.8	313,514	-31,473	141,26	110,60	25,37
569.0	3744,360	-20008.1	313,489	-31,440	141,30	110,64	25,41
570.0	3741,063	-20059.5	313,464	-31,408	141,33	110,68	25,45
571.0	3737,757	-20111.1	313,438	-31,375	141,37	110,72	25,50

Table 4-8 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SANTIAGO, CHILE

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
572.0	3734,443	-20162.8	313,413	-31,343	141,40	110,76	25,54
573.0	3731,121	-20214.6	313,388	-31,310	141,44	110,81	25,58
574.0	3727,789	-20266.6	313,362	-31,277	141,47	110,85	25,62
575.0	3724,450	-20318.8	313,337	-31,244	141,51	110,89	25,66
576.0	3721,101	-20371.1	313,311	-31,211	141,55	110,93	25,70
577.0	3717,744	-20423.6	313,286	-31,178	141,58	110,98	25,74
578.0	3714,379	-20476.2	313,260	-31,145	141,62	111,02	25,79
579.0	3711,004	-20529.0	313,234	-31,112	141,65	111,06	25,83
580.0	3707,621	-20582.0	313,208	-31,078	141,68	111,11	25,87
581.0	3704,230	-20635.1	313,182	-31,045	141,72	111,15	25,91
582.0	3700,829	-20688.4	313,156	-31,011	141,75	111,19	25,95
583.0	3697,426	-20741.8	313,130	-30,978	141,79	111,24	26,00
584.0	3694,002	-20795.4	313,104	-30,944	141,82	111,28	26,04
585.0	3690,575	-20849.1	313,077	-30,910	141,86	111,32	26,08
586.0	3687,139	-20903.0	313,051	-30,876	141,89	111,37	26,12
587.0	3683,694	-20957.0	313,024	-30,842	141,92	111,41	26,17
588.0	3680,241	-21011.1	312,998	-30,808	141,96	111,46	26,21
589.0	3676,778	-21065.5	312,971	-30,774	141,99	111,50	26,25
590.0	3673,307	-21119.9	312,944	-30,740	142,02	111,54	26,29
591.0	3669,827	-21174.6	312,918	-30,705	142,06	111,59	26,34
592.0	3666,337	-21229.4	312,891	-30,671	142,09	111,63	26,38
593.0	3662,839	-21284.3	312,864	-30,636	142,12	111,68	26,42
594.0	3659,331	-21339.4	312,837	-30,602	142,15	111,72	26,47
595.0	3655,815	-21394.7	312,809	-30,567	142,19	111,77	26,51
596.0	3652,289	-21450.1	312,782	-30,532	142,22	111,81	26,55
597.0	3648,754	-21505.7	312,755	-30,497	142,25	111,86	26,60
598.0	3645,210	-21561.5	312,727	-30,462	142,28	111,90	26,64
599.0	3641,657	-21617.4	312,700	-30,427	142,32	111,95	26,68
600.0	3638,095	-21673.6	312,672	-30,392	142,35	111,99	26,73
601.0	3634,523	-21729.8	312,644	-30,356	142,38	112,04	26,77
602.0	3630,942	-21786.3	312,616	-30,321	142,41	112,09	26,82
603.0	3627,352	-21842.9	312,589	-30,285	142,44	112,13	26,86
604.0	3623,752	-21899.8	312,561	-30,249	142,47	112,18	26,91
605.0	3620,143	-21956.8	312,532	-30,213	142,50	112,22	26,95
606.0	3616,525	-22014.0	312,504	-30,178	142,53	112,27	26,99
607.0	3612,897	-22071.4	312,476	-30,141	142,56	112,32	27,04
608.0	3609,260	-22129.0	312,448	-30,105	142,59	112,36	27,08
609.0	3605,613	-22186.8	312,419	-30,069	142,62	112,41	27,13
610.0	3601,957	-22244.9	312,390	-30,033	142,65	112,46	27,17
611.1	3597,972	-22308.2	312,359	-29,993	142,69	112,51	27,22
611.4	3596,705	-22328.3	312,349	-29,980	142,70	112,52	27,24

Table 4-8 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SANTIAGO, CHILE

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
611.4	3596,705	-22328.3	312,349	-29,980	142,70	112,52	27,24
620.0	3565,206	-22347.1	312,101	-29,666	142,30	112,57	27,18
630.0	3528,411	-22366.7	311,808	-29,298	141,84	112,64	27,12
650.0	3454,733	-22398.8	311,207	-28,556	140,90	112,79	27,01
660.0	3417,859	-22411.1	310,900	-28,183	140,43	112,87	26,95
670.0	3380,967	-22420.8	310,589	-27,808	142,65	102,42	13,43
690.0	3307,145	-22432.2	309,950	-27,052	142,21	80,07	344,80
710.0	3233,304	-22432.6	309,291	-26,288	135,89	61,97	320,02
730.0	3159,481	-22421.3	308,609	-25,516	125,87	50,48	301,23
750.0	3085,714	-22397.8	307,902	-24,735	114,06	44,12	286,61
760.0	3048,865	-22381.3	307,539	-24,341	107,83	42,32	280,20
770.0	3012,646	-22361.4	307,170	-23,944	108,08	42,02	280,24
790.0	2938,520	-22311.4	306,410	-23,144	108,58	43,84	280,31
800.0	2901,825	-22281.1	306,019	-22,740	108,85	44,35	280,35
900.0	2538,872	-21753.3	301,632	-18,527	111,91	49,85	280,98
1000.0	2188,640	-20703.7	296,107	-13,915	115,95	56,25	282,26
1100.0	1861,620	-18877.5	288,895	-8,736	121,36	64,17	284,83
1200.0	1573,842	-15847.2	279,175	-2,818	128,53	74,90	290,12
1300.0	1349,765	-11044.3	265,908	3,796	137,34	91,19	301,42
1375.7	1242,157	-6063.1	253,103	8,801	143,78	110,17	317,50
1400.0	1221,442	-4264.2	248,522	10,275	145,39	117,86	324,49
1410.0	1215,046	-3508.0	246,590	10,847	145,94	121,22	327,60
1420.0	1209,899	-2744.9	244,632	11,396	146,41	124,69	330,84
1430.0	1206,613	-1977.4	242,652	11,920	146,81	128,25	334,20
1440.0	1203,392	-1207.8	240,655	12,418	147,11	131,88	337,64
1450.0	1202,037	-436.6	238,644	12,886	147,33	135,57	341,16
1455.0	1201,834	-55.0	237,635	13,109	147,40	137,42	342,94
1460.0	1201,946	327.5	236,624	13,325	147,45	139,28	344,72
1465.0	1202,373	708.6	235,612	13,532	147,48	141,14	346,51
1470.0	1203,112	1888.3	234,599	13,732	147,48	143,00	348,31
1475.0	1204,163	1465.9	233,586	13,923	147,47	144,85	350,10
1480.0	1205,524	1841.2	232,574	14,106	147,42	146,70	351,89
1485.0	1207,193	2213.9	231,562	14,280	147,36	148,53	353,67
1490.0	1209,167	2583.8	230,552	14,446	147,27	150,35	355,43
1495.0	1211,444	2950.7	229,545	14,604	147,16	152,15	357,19
1495.7	1211,764	2998.2	229,413	14,624	147,15	152,39	357,42
1500.0	1214,022	3314.1	228,540	14,753	147,03	153,94	358,93
1505.0	1216,898	3674.0	227,538	14,893	146,88	155,70	,65
1510.0	1220,068	4030.0	226,540	15,025	146,72	157,44	2,35
1515.0	1223,529	4382.0	225,546	15,148	146,53	159,15	4,02
1520.0	1227,278	4729.7	224,557	15,262	146,32	160,84	5,67

Table 4-8 (Concluded)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

SANTIAGO, CHILE

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
1525.0	1231,312	5072.9	223,573	15,368	146,10	162,50	7,29
1530.0	1235,626	5411.4	222,595	15,466	145,86	164,12	8,89
1535.0	1240,217	5745.2	221,623	15,555	145,60	165,72	10,45
1540.0	1245,080	6073.9	220,657	15,635	145,33	167,28	11,98
1545.0	1250,212	6397.5	219,699	15,708	145,05	168,82	13,48
1550.0	1255,668	6715.9	218,748	15,772	144,75	170,31	14,95
1650.0	1411,885	11893.1	201,685	15,603	137,41	193,64	37,53
1750.0	1635,484	14979.4	188,746	13,633	130,13	207,80	50,26
1850.0	1897,037	16618.9	179,269	10,963	124,30	217,22	57,60
1950.0	2177,782	17388.7	172,222	8,128	119,87	224,16	62,08
2050.0	2466,632	17648.7	166,809	5,334	116,49	229,68	64,96
2062.3	2502,275	17656.7	166,229	4,997	116,14	230,29	65,24
2150.0	2757,053	17604.9	162,500	2,644	113,89	234,33	66,89
2250.0	3045,101	17375.2	158,957	,074	111,84	238,40	68,22
2350.0	3328,338	17029.1	155,955	-2,382	110,20	242,06	69,15
2450.0	3605,225	16609.1	153,349	-4,735	108,88	245,43	69,81
2550.0	3874,784	16142.1	151,037	-6,996	107,78	248,56	70,28
2636.1	4100,509	15715.8	149,225	-8,876	106,99	251,11	70,56
2650.0	4136,393	15645.5	148,946	-9,175	106,87	251,52	70,60
2750.0	4369,669	15131.0	147,026	-11,281	106,11	254,33	70,80
2850.0	4634,388	14606.6	145,238	-13,322	105,46	257,02	70,92
2908.9	4774,545	14295.2	144,234	-14,497	105,12	258,56	70,95
2950.0	4870,433	14077.7	143,552	-15,305	104,91	259,62	70,96
3050.0	5097,764	13548.2	141,948	-17,237	104,43	262,13	70,95
3150.0	5316,395	13020.7	140,406	-19,122	104,02	264,57	70,88
3250.0	5526,372	12497.0	138,914	-20,966	103,67	266,96	70,77
3350.0	5727,770	11978.2	137,458	-22,771	103,36	269,29	70,61
3450.0	5920,677	11465.2	136,029	-24,543	103,09	271,58	70,42
3550.0	6105,192	10958.4	134,619	-26,284	102,85	273,83	70,20
3650.0	6281,418	10456.1	133,221	-27,998	102,65	276,05	69,94
3750.0	6449,463	9964.1	131,827	-29,686	102,47	278,24	69,64
3850.0	6609,431	9476.6	130,433	-31,353	102,31	280,41	69,32
3950.0	6761,426	8995.1	129,032	-32,999	102,18	282,56	68,96
4050.0	6905,545	8519.5	127,619	-34,627	102,07	284,70	68,57
4150.0	7041,883	8049.4	126,190	-36,239	101,97	286,82	68,14
4250.0	7170,527	7584.4	124,738	-37,837	101,88	288,93	67,68
4350.0	7291,557	7124.1	123,259	-39,422	101,81	291,03	67,18
4450.0	7405,044	6667.9	121,748	-40,996	101,76	293,13	66,64
4550.0	7511,054	6215.3	120,197	-42,560	101,71	295,23	66,05
4602.3	7563,582	5979.7	119,368	-43,375	101,69	296,33	65,72

Table 4-9

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

TANANARIVE, MADAGASCAR

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
0.0	6789,446	.0	327,643	-80,613	90,00	0,00	0,00
2.0	6789,449	14.8	327,643	-80,613	9,64	312,70	358,93
5.0	6789,463	46.2	327,643	-80,613	9,63	299,15	358,88
10.0	6789,531	124.7	327,643	-80,612	9,62	276,57	358,80
15.0	6789,679	241.3	327,643	-80,612	4,54	230,72	22,11
16.0	6789,721	269.2	327,643	-80,612	3,99	212,52	35,81
20.0	6789,938	393.6	327,643	-80,612	3,98	212,59	35,75
20.5	6789,971	410.5	327,643	-80,612	3,98	212,60	35,74
25.0	6790,334	573.1	327,642	-80,612	3,33	178,83	69,58
30.0	6790,886	769.7	327,640	-80,612	4,17	142,72	105,77
35.0	6791,602	969.1	327,637	-80,612	5,98	123,53	125,04
37.0	6791,932	1046.4	327,636	-80,613	6,81	118,94	129,65
37.0	6791,934	1046.7	327,636	-80,613	6,81	118,92	129,67
38.6	6792,215	1055.7	327,634	-80,613	7,57	115,78	132,84
39.0	6792,282	1051.2	327,634	-80,613	7,75	115,12	133,51
39.2	6792,316	1050.7	327,634	-80,613	7,85	114,79	133,84
40.0	6792,455	1054.2	327,633	-80,613	8,23	113,55	135,10
45.0	6793,333	1084.9	327,628	-80,614	10,40	107,84	140,88
50.0	6794,247	1139.1	327,622	-80,615	13,22	104,31	144,49
55.0	6795,216	1220.2	327,615	-80,617	15,74	101,96	146,92
60.0	6796,262	1326.9	327,606	-80,619	18,28	100,26	148,69
65.0	6797,405	1453.3	327,595	-80,622	21,48	98,73	150,31
70.0	6798,657	1590.8	327,582	-80,626	24,69	97,60	151,52
75.0	6800,023	1730.4	327,566	-80,631	27,91	96,74	152,47
76.2	6800,366	1762.9	327,562	-80,633	28,58	96,58	152,64
77.8	6800,840	1777.2	327,556	-80,635	29,49	96,38	152,86
80.0	6801,478	1772.7	327,547	-80,637	30,71	96,14	153,14
85.0	6802,934	1764.9	327,527	-80,644	33,52	95,64	153,70
90.0	6804,383	1759.1	327,504	-80,652	36,43	95,21	154,20
95.0	6805,829	1753.3	327,479	-80,660	39,35	94,85	154,63
96.0	6806,117	1752.1	327,474	-80,662	39,93	94,78	154,71
100.0	6807,273	1760.8	327,452	-80,670	42,27	94,54	155,00
105.0	6808,727	1772.1	327,422	-80,680	43,07	96,54	142,74
110.0	6810,191	1785.3	327,388	-80,692	44,13	98,21	130,72
115.0	6811,665	1798.6	327,348	-80,705	45,40	99,52	118,99
120.0	6813,151	1811.5	327,301	-80,718	46,82	100,42	107,56
125.0	6814,647	1825.3	327,246	-80,731	47,89	100,23	107,70
130.0	6816,155	1841.4	327,183	-80,745	48,95	100,05	108,00
135.0	6817,678	1859.7	327,111	-80,760	50,01	99,88	108,19
140.0	6819,216	1879.9	327,031	-80,775	51,08	99,72	108,37
145.0	6820,772	1902.0	326,941	-80,790	52,14	99,56	108,53

Table 4-9 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

TANANARIVE, MADAGASCAR

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
150.0	6822,347	1925.6	326,841	-80,807	53,20	99,42	108,67
155.0	6823,942	1950.8	326,732	-80,824	54,25	99,28	108,80
160.0	6825,558	1977.7	326,612	-80,841	55,31	99,15	108,91
165.0	6827,197	2006.1	326,481	-80,859	56,37	99,03	109,01
170.0	6828,860	2036.2	326,338	-80,878	57,42	98,91	109,08
175.0	6830,549	2067.9	326,183	-80,898	58,47	98,80	109,14
180.0	6832,264	2101.4	326,015	-80,919	59,52	98,69	109,18
185.0	6834,008	2136.7	325,833	-80,940	60,57	98,59	109,21
190.0	6835,781	2174.0	325,637	-80,962	61,62	98,49	109,21
195.0	6837,586	2213.5	325,425	-80,985	62,66	98,40	109,20
200.0	6839,425	2255.2	325,198	-81,009	63,70	98,32	109,17
205.0	6841,299	2299.4	324,953	-81,034	64,74	98,23	109,11
210.0	6843,210	2346.2	324,690	-81,059	65,78	98,16	109,04
215.0	6845,161	2395.7	324,407	-81,086	66,82	98,08	108,94
220.0	6847,153	2448.2	324,103	-81,114	67,85	98,01	108,82
225.0	6849,191	2504.0	323,778	-81,142	68,87	97,95	108,68
230.0	6851,275	2563.5	323,428	-81,172	69,90	97,88	108,50
235.0	6853,411	2627.2	323,053	-81,203	70,92	97,82	108,30
240.0	6855,600	2695.5	322,649	-81,234	71,94	97,77	108,07
245.0	6857,848	2769.0	322,216	-81,267	72,95	97,72	107,81
250.0	6860,159	2848.2	321,749	-81,301	73,96	97,67	107,52
255.0	6862,538	2934.1	321,247	-81,336	74,96	97,62	107,18
260.0	6864,990	3027.6	320,705	-81,372	75,96	97,58	106,81
264.0	6867,010	3108.7	320,246	-81,402	76,95	97,54	106,48
265.0	6867,523	3129.9	320,119	-81,409	76,95	97,54	106,39
269.0	6869,612	3218.5	319,615	-81,440	77,74	97,51	106,02
269.6	6869,909	3231.2	319,542	-81,444	77,85	97,50	105,96
269.9	6870,086	3228.4	319,498	-81,447	77,84	97,50	105,92
269.9	6870,087	3228.4	319,498	-81,447	77,84	97,50	105,92
270.0	6870,144	3225.9	319,484	-81,448	77,84	97,50	105,91
275.0	6872,750	3107.9	318,823	-81,486	77,72	97,50	105,26
275.6	6873,035	3094.8	318,749	-81,490	77,71	97,50	105,19
277.6	6874,046	3046.6	318,483	-81,506	77,67	97,49	104,93
280.0	6875,258	2987.9	318,157	-81,524	77,61	97,49	104,61
281.6	6876,020	2950.4	317,948	-81,535	77,57	97,49	104,41
281.8	6876,122	2945.3	317,920	-81,537	77,57	97,49	104,38
281.9	6876,165	2943.4	317,908	-81,537	77,57	97,49	104,37
282.6	6876,504	2929.6	317,814	-81,543	77,55	97,49	104,28
283.6	6876,984	2918.0	317,679	-81,550	77,53	97,49	104,15
285.0	6877,671	2881.7	317,484	-81,560	77,61	97,48	103,98
290.0	6880,002	2784.8	316,802	-81,596	77,90	97,46	103,37

Table 4-9 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

TANANARIVE, MADAGASCAR

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
291.6	6880,713	2754.6	316,588	-81,607	77,99	97,46	103,17
300.0	6884,427	2591.6	315,408	-81,665	78,48	97,43	102,11
301.6	6885,088	2561.6	315,188	-81,675	78,57	97,43	101,92
310.0	6888,533	2399.4	313,974	-81,730	79,06	97,40	100,82
320.0	6892,325	2208.3	312,499	-81,791	79,63	97,37	99,49
330.0	6895,803	2018.2	310,983	-81,848	80,20	97,34	98,11
340.0	6898,969	1829.1	309,426	-81,900	80,77	97,32	96,70
350.0	6901,824	1641.0	307,829	-81,947	81,33	97,29	95,24
360.0	6904,371	1453.9	306,190	-81,989	81,89	97,27	93,74
370.0	6906,610	1267.8	304,513	-82,025	82,45	97,24	92,20
380.0	6908,544	1082.7	302,796	-82,055	83,00	97,22	90,62
390.0	6910,175	898.6	301,041	-82,079	83,55	97,20	89,00
400.0	6911,503	715.4	299,251	-82,096	84,10	97,18	87,35
410.0	6912,530	533.2	297,426	-82,106	84,64	97,16	85,66
420.0	6913,258	352.0	295,569	-82,108	85,18	97,14	83,94
430.0	6913,689	171.8	293,683	-82,101	85,72	97,12	82,19
440.0	6913,825	-7.4	291,770	-82,087	86,25	97,11	80,41
450.0	6913,666	-185.6	289,833	-82,063	86,77	97,09	78,61
460.0	6913,214	-362.9	287,875	-82,031	87,29	97,08	76,79
470.0	6912,472	-539.1	285,901	-81,988	87,81	97,07	74,95
480.0	6911,440	-714.2	283,914	-81,936	88,32	97,06	73,10
490.0	6910,121	-888.3	281,917	-81,873	88,83	97,04	71,24
500.0	6908,517	-1061.4	279,915	-81,799	89,33	97,03	69,37
510.0	6906,628	-1233.3	277,912	-81,713	89,82	97,03	67,50
520.0	6904,458	-1404.2	275,912	-81,617	90,31	97,02	65,64
521.6	6904,094	-1430.8	275,600	-81,600	90,39	97,02	65,35
530.0	6902,007	-1573.9	273,918	-81,508	90,80	97,01	63,78
540.0	6899,278	-1742.5	271,935	-81,386	91,27	97,00	61,93
550.0	6896,272	-1909.9	269,966	-81,252	91,74	97,00	60,10
560.0	6892,892	-2075.9	268,015	-81,105	92,20	96,99	58,29
561.0	6892,649	-2092.4	267,821	-81,089	92,25	96,99	58,10
562.0	6892,303	-2108.9	267,628	-81,074	92,29	96,99	57,92
563.0	6891,955	-2125.4	267,434	-81,058	92,34	96,99	57,74
564.0	6891,604	-2141.9	267,241	-81,042	92,38	96,99	57,57
565.0	6891,250	-2158.4	267,048	-81,026	92,43	96,99	57,39
566.0	6890,893	-2174.8	266,855	-81,010	92,47	96,99	57,21
567.0	6890,534	-2191.2	266,662	-80,993	92,52	96,99	57,03
568.0	6890,172	-2207.6	266,470	-80,977	92,57	96,99	56,85
569.0	6889,807	-2224.0	266,278	-80,960	92,61	96,99	56,67
570.0	6889,440	-2240.4	266,086	-80,944	92,66	96,99	56,49
571.0	6889,070	-2256.8	265,895	-80,927	92,70	96,99	56,31

Table 4-9 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

TANANARIVE, MADAGASCAR

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
572.0	6888,697	=2273.1	265,703	-80,910	92,75	96,99	56,14
573.0	6888,321	=2289.5	265,512	-80,893	92,79	96,99	55,96
574.0	6887,943	=2305.8	265,321	-80,876	92,83	96,99	55,78
575.0	6887,562	=2322.1	265,131	-80,858	92,88	96,98	55,60
576.0	6887,179	=2338.3	264,941	-80,841	92,92	96,98	55,43
577.0	6886,793	=2354.6	264,751	-80,823	92,97	96,98	55,25
578.0	6886,404	=2370.9	264,561	-80,805	93,01	96,98	55,08
579.0	6886,012	=2387.1	264,371	-80,787	93,06	96,98	54,90
580.0	6885,618	=2403.3	264,182	-80,769	93,10	96,98	54,72
581.0	6885,221	=2419.5	263,993	-80,751	93,15	96,98	54,55
582.0	6884,822	=2435.7	263,805	-80,732	93,19	96,98	54,37
583.0	6884,426	=2451.8	263,616	-80,714	93,23	96,98	54,20
584.0	6884,015	=2468.0	263,428	-80,695	93,28	96,98	54,03
585.0	6883,607	=2484.1	263,241	-80,676	93,32	96,98	53,85
586.0	6883,197	=2500.2	263,053	-80,657	93,36	96,98	53,68
587.0	6882,784	=2516.3	262,866	-80,638	93,41	96,98	53,50
588.0	6882,369	=2532.3	262,679	-80,619	93,45	96,98	53,33
589.0	6881,951	=2548.4	262,493	-80,600	93,49	96,98	53,16
590.0	6881,530	=2564.4	262,307	-80,580	93,54	96,98	52,99
591.0	6881,107	=2580.4	262,121	-80,560	93,58	96,98	52,81
592.0	6880,681	=2596.4	261,935	-80,541	93,62	96,98	52,64
593.0	6880,252	=2612.3	261,750	-80,521	93,67	96,98	52,47
594.0	6879,821	=2628.3	261,565	-80,500	93,71	96,98	52,30
595.0	6879,387	=2644.2	261,380	-80,480	93,75	96,98	52,13
596.0	6878,951	=2660.1	261,196	-80,460	93,80	96,98	51,96
597.0	6878,511	=2676.0	261,012	-80,439	93,84	96,98	51,79
598.0	6878,070	=2691.8	260,828	-80,418	93,88	96,98	51,62
599.0	6877,625	=2707.7	260,645	-80,398	93,92	96,98	51,45
600.0	6877,178	=2723.5	260,462	-80,377	93,97	96,98	51,28
601.0	6876,729	=2739.3	260,278	-80,355	94,01	96,98	51,11
602.0	6876,277	=2755.0	260,097	-80,334	94,05	96,98	50,94
603.0	6875,822	=2770.8	259,915	-80,313	94,09	96,98	50,77
604.0	6875,365	=2786.5	259,734	-80,291	94,14	96,98	50,60
605.0	6874,905	=2802.2	259,552	-80,269	94,18	96,98	50,44
606.0	6874,442	=2817.9	259,371	-80,247	94,22	96,98	50,27
607.0	6873,977	=2833.6	259,191	-80,225	94,26	96,98	50,10
608.0	6873,510	=2849.3	259,011	-80,203	94,30	96,98	49,94
609.0	6873,039	=2864.9	258,831	-80,181	94,34	96,98	49,77
610.0	6872,567	=2880.5	258,651	-80,158	94,39	96,98	49,60
611.1	6872,050	=2897.4	258,457	-80,134	94,43	96,98	49,42
611.4	6871,885	=2902.8	258,395	-80,126	94,45	96,97	49,37

Table 4-9 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

TANANARIVE, MADAGASCAR

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
611.4	6871,885	-2902.8	258,395	-80,126	94,45	96,97	49,37
620.0	6867,731	-2989.3	256,892	-79,927	94,10	96,97	47,90
630.0	6862,728	-3090.1	255,208	-79,687	93,70	96,96	46,25
650.0	6852,225	-3291.4	252,060	-79,185	92,91	96,94	43,18
660.0	6846,726	-3391.7	250,589	-78,923	92,51	96,94	41,74
670.0	6841,861	-3491.9	249,184	-78,655	93,14	96,53	31,60
690.0	6829,239	-3691.5	246,557	-78,101	94,25	95,61	11,46
710.0	6816,761	-3890.0	244,154	-77,526	95,18	94,61	351,54
730.0	6803,632	-4087.3	241,954	-76,934	95,95	93,52	331,76
750.0	6789,855	-4283.2	239,934	-76,325	96,58	92,33	312,16
760.0	6782,726	-4380.5	238,987	-76,016	96,85	91,69	302,41
770.0	6775,437	-4477.5	238,077	-75,703	96,83	92,10	301,58
790.0	6760,381	-4670.1	236,365	-75,069	96,80	92,90	300,03
800.0	6752,617	-4765.7	235,558	-74,747	96,79	93,30	299,31
900.0	6666,482	-5692.0	228,941	-71,422	96,65	97,32	293,51
1000.0	6565,616	-6553.4	224,181	-67,958	96,53	101,33	289,53
1100.0	6451,198	-7337.2	220,571	-64,417	96,43	105,32	286,69
1200.0	6324,579	-8935.0	217,714	-60,832	96,34	109,30	284,57
1300.0	6187,213	-8642.9	215,373	-57,221	96,26	113,27	282,95
1375.7	6077,061	-9042.5	213,853	-54,478	96,21	116,26	281,97
1400.0	6040,589	-9160.2	213,481	-53,594	96,20	117,22	281,68
1410.0	6025,475	-9207.0	213,220	-53,231	96,19	117,61	281,57
1420.0	6010,284	-9252.9	213,042	-52,868	96,19	118,01	281,46
1430.0	5995,018	-9298.0	212,866	-52,504	96,18	118,40	281,36
1440.0	5979,679	-9342.2	212,693	-52,140	96,18	118,79	281,25
1450.0	5964,268	-9385.5	212,522	-51,777	96,17	119,19	281,15
1455.0	5956,536	-9406.9	212,438	-51,595	96,17	119,38	281,10
1460.0	5948,787	-9428.0	212,354	-51,413	96,16	119,58	281,05
1465.0	5941,020	-9448.9	212,271	-51,231	96,16	119,78	281,00
1470.0	5933,236	-9469.6	212,188	-51,049	96,16	119,97	280,95
1475.0	5925,435	-9490.1	212,106	-50,867	96,16	120,17	280,90
1480.0	5917,617	-9510.3	212,024	-50,685	96,15	120,37	280,86
1485.0	5909,783	-9530.4	211,943	-50,503	96,15	120,56	280,81
1490.0	5901,932	-9550.2	211,862	-50,321	96,15	120,76	280,76
1495.0	5894,065	-9569.9	211,782	-50,139	96,15	120,96	280,72
1495.7	5883,938	-9572.4	211,772	-50,115	96,15	120,88	280,71
1500.0	5886,182	-9589.3	211,703	-49,957	96,14	121,15	280,67
1505.0	5878,283	-9608.5	211,624	-49,775	96,14	121,35	280,63
1510.0	5870,369	-9627.5	211,545	-49,593	96,14	121,55	280,58
1515.0	5862,438	-9646.3	211,467	-49,411	96,14	121,74	280,54
1520.0	5854,493	-9664.9	211,390	-49,229	96,13	121,94	280,49

Table 4-9 (Concluded)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

TANANARIVE, MADAGASCAR

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
1525.0	5846,532	=9683.3	211,313	-49,046	96,13	122,14	280,45
1530.0	5838,556	=9701.5	211,236	-48,864	96,13	122,33	280,41
1535.0	5830,565	=9719.4	211,160	-48,682	96,13	122,53	280,37
1540.0	5822,560	=9737.2	211,084	-48,500	96,13	122,72	280,32
1545.0	5814,540	=9754.8	211,009	-48,317	96,12	122,92	280,28
1550.0	5806,506	=9772.1	210,935	-48,135	96,12	123,12	280,24
1650.0	5643,055	=10077.7	209,530	-44,484	96,08	127,04	279,51
1750.0	5475,201	=10308.3	208,271	-40,821	96,05	130,96	278,90
1850.0	5304,127	=10470.2	207,128	-37,142	96,02	134,89	278,41
1950.0	5130,909	=10569.8	206,081	-33,440	96,00	138,82	278,01
2050.0	4956,525	=10612.8	205,112	-29,710	95,99	142,78	277,68
2062.3	4938,095	=10614.5	204,998	-29,250	95,99	143,27	277,65
2150.0	4781,861	=10604.6	204,209	-25,942	95,98	146,77	277,42
2250.0	4607,724	=10549.5	203,362	-22,128	95,97	150,79	277,22
2350.0	4434,853	=10451.2	202,561	-18,258	95,96	154,87	277,08
2450.0	4263,936	=10312.5	201,799	-14,319	95,96	159,01	276,98
2550.0	4095,621	=10135.2	201,071	-10,300	95,95	163,23	276,93
2636.1	3953,272	=9952.6	200,465	-6,765	95,94	166,83	276,93
2650.0	3930,533	=9920.5	200,368	-6,187	95,94	167,53	276,93
2750.0	3769,284	=9668.5	199,687	-1,967	95,93	171,94	276,98
2850.0	3612,493	=9378.6	199,021	2,376	95,91	176,47	277,07
2908.9	3522,437	=9189.6	198,633	4,999	95,89	179,20	277,15
2950.0	3460,794	=9049.5	198,364	6,857	95,88	181,14	277,22
3050.0	3314,848	=8679.0	197,709	11,493	95,84	185,96	277,42
3150.0	3175,360	=8264.3	197,048	16,301	95,79	190,94	277,69
3250.0	3043,081	=7802.3	196,372	21,296	95,72	196,12	278,02
3350.0	2918,820	=7289.5	195,666	26,493	95,62	201,49	278,44
3450.0	2803,439	=6722.5	194,912	31,904	95,51	207,08	278,95
3550.0	2697,854	=6098.7	194,084	37,538	95,36	212,89	279,58
3650.0	2603,017	=5416.3	193,140	43,396	95,18	218,92	280,37
3750.0	2519,892	=4675.7	192,015	49,472	94,96	225,18	281,37
3850.0	2449,418	=3879.6	190,588	55,749	94,70	231,65	282,71
3950.0	2392,464	=3034.1	188,630	62,194	94,41	238,29	284,60
4050.0	2349,768	=2148.7	185,620	68,754	94,06	245,09	287,56
4150.0	2321,886	=1236.3	180,113	75,329	93,68	251,99	293,02
4250.0	2309,139	=312.2	166,359	81,642	93,27	258,94	306,73
4350.0	2311,580	606.6	111,776	85,789	92,83	265,88	1,27
4450.0	2328,984	1503.4	49,351	82,387	92,38	272,76	63,63
4550.0	2360,865	2363.5	33,591	76,330	91,91	279,53	79,32
4602.3	2383,094	2794.9	29,938	73,039	91,67	283,01	82,93

Table 4-10

AE-C SPACECRAFT MISSION RADAR PARAMETERS

JOHANNESBURG, SOUTH AFRICA

TIME SEC	D * N MI	D DOT * FT/SEC	A * DEG	E * DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
0.0	6669,009	.0	295,039	-75,750	90,00	0,00	0,00
2.0	6669,011	14.5	295,039	-75,750	14,35	269,51	358,73
5.0	6669,025	45.4	295,039	-75,750	14,34	255,92	358,72
10.0	6669,092	122.6	295,040	-75,750	14,32	233,26	358,71
15.0	6669,237	236.8	295,039	-75,750	12,62	187,49	22,42
16.0	6669,279	264.0	295,039	-75,750	12,83	177,94	27,57
20.0	6669,491	384.9	295,039	-75,749	12,82	177,93	27,59
20.5	6669,523	401.3	295,039	-75,749	12,82	177,93	27,59
25.0	6669,878	559.2	295,037	-75,749	13,07	168,35	37,42
30.0	6670,416	749.8	295,034	-75,748	13,75	158,43	47,62
35.0	6671,112	942.2	295,029	-75,747	14,81	149,71	56,62
37.0	6671,433	1016.6	295,026	-75,747	15,32	146,61	59,84
37.0	6671,435	1017.0	295,026	-75,747	15,33	146,59	59,85
38.6	6671,708	1025.1	295,024	-75,746	15,81	144,07	62,47
39.0	6671,773	1020.6	295,023	-75,746	15,93	143,49	63,08
39.2	6671,806	1020.1	295,023	-75,746	15,99	143,19	63,39
40.0	6671,941	1023.2	295,022	-75,746	16,24	142,02	64,60
45.0	6672,793	1050.8	295,013	-75,745	17,27	135,53	71,39
50.0	6673,676	1100.7	295,003	-75,745	19,89	130,26	76,96
55.0	6674,611	1176.2	294,991	-75,744	21,91	126,02	81,49
60.0	6675,619	1276.0	294,976	-75,744	24,04	122,54	85,26
65.0	6676,717	1394.1	294,957	-75,744	26,82	119,01	89,15
70.0	6677,916	1522.0	294,935	-75,744	29,69	116,17	92,35
75.0	6679,222	1650.9	294,908	-75,744	32,62	113,37	95,02
76.2	6679,548	1680.8	294,900	-75,744	33,23	113,44	95,51
77.8	6680,000	1692.9	294,890	-75,745	34,07	112,89	96,17
80.0	6680,608	1686.5	294,876	-75,745	35,21	112,19	97,00
85.0	6681,990	1674.0	294,841	-75,746	37,82	110,77	98,74
90.0	6683,363	1662.8	294,803	-75,748	40,57	109,50	100,33
95.0	6684,727	1651.3	294,762	-75,750	43,33	108,41	101,75
96.0	6684,998	1648.9	294,753	-75,750	43,89	108,21	102,02
100.0	6686,085	1651.8	294,716	-75,752	46,11	107,47	103,02
105.0	6687,444	1652.3	294,666	-75,755	48,64	107,77	92,19
110.0	6688,803	1648.3	294,611	-75,759	51,14	107,46	81,76
115.0	6690,156	1630.7	294,551	-75,762	53,57	106,60	71,64
120.0	6691,498	1623.8	294,486	-75,765	55,84	105,27	61,76
125.0	6692,828	1607.6	294,415	-75,767	56,88	105,07	62,06
130.0	6694,145	1593.0	294,340	-75,769	57,92	104,89	62,33
135.0	6695,450	1579.7	294,258	-75,771	58,96	104,71	62,60
140.0	6696,745	1567.2	294,171	-75,771	60,00	104,55	62,85
145.0	6698,029	1555.2	294,078	-75,771	61,03	104,39	63,09

Table 4-10 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

JOHANNESBURG, SOUTH AFRICA

TIME SEC	B • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
150.0	6699,304	1543.6	293,979	-75,771	62,07	104,24	63,32
155.0	6700,570	1532.1	293,873	-75,770	63,11	104,09	63,53
160.0	6701,826	1520.6	293,760	-75,768	64,14	103,96	63,73
165.0	6703,072	1509.1	293,639	-75,766	65,18	103,83	63,92
170.0	6704,310	1497.5	293,512	-75,763	66,21	103,71	64,10
175.0	6705,537	1485.6	293,376	-75,759	67,24	103,59	64,26
180.0	6706,755	1473.5	293,232	-75,754	68,27	103,48	64,41
185.0	6707,962	1461.1	293,079	-75,749	69,30	103,38	64,55
190.0	6709,159	1448.3	292,918	-75,743	70,32	103,29	64,68
195.0	6710,345	1435.1	292,747	-75,735	71,35	103,20	64,79
200.0	6711,521	1421.5	292,566	-75,727	72,37	103,11	64,89
205.0	6712,685	1407.3	292,375	-75,718	73,39	103,03	64,98
210.0	6713,837	1392.5	292,173	-75,707	74,40	102,96	65,06
215.0	6714,976	1377.1	291,959	-75,695	75,42	102,89	65,12
220.0	6716,103	1360.8	291,734	-75,682	76,43	102,82	65,16
225.0	6717,216	1343.5	291,496	-75,668	77,43	102,76	65,19
230.0	6718,314	1325.0	291,244	-75,651	78,44	102,71	65,21
235.0	6719,396	1305.2	290,978	-75,634	79,44	102,66	65,21
240.0	6720,461	1284.1	290,697	-75,614	80,43	102,61	65,20
245.0	6721,509	1261.4	290,399	-75,592	81,43	102,57	65,16
250.0	6722,537	1236.8	290,085	-75,569	82,41	102,54	65,11
255.0	6723,544	1209.7	289,751	-75,542	83,39	102,50	65,04
260.0	6724,527	1179.7	289,397	-75,514	84,37	102,47	64,95
264.0	6725,295	1153.0	289,099	-75,488	85,35	102,45	64,86
265.0	6725,484	1145.9	289,022	-75,482	85,34	102,45	64,84
269.0	6726,229	1113.4	288,704	-75,454	86,31	102,43	64,73
269.6	6726,331	1110.8	288,658	-75,450	86,22	102,43	64,71
269.9	6726,392	1104.8	288,631	-75,447	86,21	102,43	64,69
269.9	6726,392	1104.8	288,631	-75,447	86,21	102,43	64,69
270.0	6726,411	1102.3	288,622	-75,446	86,21	102,43	64,68
275.0	6727,272	988.2	288,212	-75,409	86,09	102,43	64,29
275.6	6727,362	975.4	288,167	-75,405	86,08	102,42	64,25
277.6	6727,675	929.5	288,003	-75,390	86,03	102,42	64,10
280.0	6728,038	873.4	287,804	-75,372	85,97	102,42	63,91
281.6	6728,257	837.6	287,678	-75,360	85,93	102,42	63,79
281.8	6728,286	832.8	287,660	-75,358	85,93	102,42	63,77
281.9	6728,298	830.8	287,653	-75,358	85,92	102,42	63,77
282.6	6728,393	815.7	287,596	-75,352	85,91	102,42	63,71
283.6	6728,526	794.3	287,515	-75,345	85,88	102,42	63,64
285.0	6728,710	763.3	287,398	-75,334	85,96	102,42	63,55
290.0	6729,294	656.4	286,991	-75,295	86,24	102,41	63,26

Table 4-10 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

JOHANNESBURG, SOUTH AFRICA

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
291.6	6729,459	623.1	286,864	-75,283	86,33	102,40	63,16
300.0	6730,199	442.8	286,176	-75,215	86,80	102,39	62,66
301.6	6730,308	409.5	286,049	-75,203	86,89	102,39	62,57
310.0	6730,752	229.4	285,359	-75,133	87,35	102,38	62,07
320.0	6730,954	16.3	284,540	-75,047	87,91	102,36	61,47
330.0	6730,806	-196.6	283,719	-74,958	88,45	102,35	60,88
340.0	6730,307	-409.4	282,895	-74,866	89,00	102,34	60,28
350.0	6729,458	-622.1	282,070	-74,770	89,54	102,34	59,67
360.0	6728,259	-834.7	281,243	-74,671	90,08	102,33	59,07
370.0	6726,711	-1047.3	280,415	-74,568	90,62	102,33	58,47
380.0	6724,812	-1260.0	279,584	-74,461	91,15	102,33	57,86
390.0	6722,563	-1472.9	278,752	-74,350	91,68	102,32	57,25
400.0	6719,964	-1686.0	277,919	-74,235	92,21	102,33	56,64
410.0	6717,014	-1899.3	277,084	-74,116	92,73	102,33	56,03
420.0	6713,712	-2112.9	276,247	-73,992	93,25	102,33	55,42
430.0	6710,058	-2327.0	275,409	-73,864	93,77	102,34	54,81
440.0	6706,052	-2541.6	274,569	-73,731	94,28	102,35	54,20
450.0	6701,692	-2756.8	273,728	-73,593	94,78	102,36	53,58
460.0	6696,978	-2972.6	272,885	-73,449	95,28	102,37	52,97
470.0	6691,907	-3189.2	272,042	-73,301	95,78	102,38	52,35
480.0	6686,480	-3406.8	271,196	-73,146	96,27	102,40	51,74
490.0	6680,693	-3625.4	270,350	-72,986	96,76	102,42	51,12
500.0	6674,546	-3845.1	269,501	-72,820	97,24	102,43	50,51
510.0	6668,036	-4066.2	268,652	-72,648	97,71	102,45	49,89
520.0	6661,161	-4288.7	267,801	-72,468	98,18	102,47	49,27
521.6	6660,056	-4323.6	267,668	-72,440	98,26	102,48	49,18
530.0	6653,918	-4512.9	266,948	-72,282	98,65	102,50	48,65
540.0	6646,305	-4738.7	266,094	-72,089	99,10	102,52	48,04
550.0	6638,319	-4966.4	265,238	-71,887	99,55	102,54	47,42
560.0	6629,957	-5195.5	264,380	-71,678	99,99	102,57	46,80
561.0	6629,100	-5218.5	264,294	-71,657	100,03	102,57	46,74
562.0	6628,239	-5241.5	264,208	-71,635	100,08	102,58	46,68
563.0	6627,375	-5264.6	264,122	-71,614	100,12	102,58	46,61
564.0	6626,506	-5287.6	264,036	-71,592	100,16	102,58	46,55
565.0	6625,634	-5310.6	263,951	-71,570	100,21	102,58	46,49
566.0	6624,758	-5333.7	263,865	-71,549	100,25	102,59	46,43
567.0	6623,879	-5356.7	263,779	-71,527	100,29	102,59	46,37
568.0	6622,995	-5379.8	263,693	-71,505	100,34	102,59	46,30
569.0	6622,108	-5402.9	263,607	-71,483	100,38	102,59	46,24
570.0	6621,217	-5426.0	263,521	-71,460	100,42	102,60	46,18
571.0	6620,322	-5449.1	263,435	-71,438	100,46	102,60	46,12

Table 4-10 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

JOHANNESBURG, SOUTH AFRICA

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
572.0	6619,423	=5472.2	263,349	-71,416	100,51	102,60	46,06
573.0	6618,521	=5495.3	263,263	-71,393	100,55	102,61	45,99
574.0	6617,614	=5518.5	263,177	-71,371	100,59	102,61	45,93
575.0	6616,704	=5541.6	263,090	-71,348	100,63	102,61	45,87
576.0	6615,790	=5564.8	263,004	-71,326	100,68	102,61	45,81
577.0	6614,873	=5588.0	262,918	-71,303	100,72	102,62	45,75
578.0	6613,951	=5611.2	262,832	-71,280	100,76	102,62	45,69
579.0	6613,026	=5634.4	262,746	-71,257	100,80	102,62	45,62
580.0	6612,096	=5657.6	262,660	-71,234	100,85	102,63	45,56
581.0	6611,163	=5680.8	262,574	-71,211	100,89	102,63	45,50
582.0	6610,226	=5704.0	262,487	-71,187	100,93	102,63	45,44
583.0	6609,286	=5727.3	262,401	-71,164	100,97	102,64	45,38
584.0	6608,341	=5750.6	262,315	-71,141	101,01	102,64	45,31
585.0	6607,393	=5773.8	262,229	-71,117	101,05	102,64	45,25
586.0	6606,441	=5797.1	262,143	-71,094	101,10	102,64	45,19
587.0	6605,485	=5820.4	262,056	-71,070	101,14	102,65	45,13
588.0	6604,525	=5843.7	261,970	-71,046	101,18	102,65	45,07
589.0	6603,561	=5867.0	261,884	-71,022	101,22	102,65	45,00
590.0	6602,594	=5890.3	261,798	-70,998	101,26	102,66	44,94
591.0	6601,622	=5913.7	261,711	-70,974	101,30	102,66	44,88
592.0	6600,647	=5937.0	261,625	-70,950	101,34	102,66	44,82
593.0	6599,668	=5960.3	261,539	-70,926	101,38	102,67	44,76
594.0	6598,685	=5983.7	261,452	-70,901	101,42	102,67	44,70
595.0	6597,699	=6007.1	261,366	-70,877	101,47	102,67	44,63
596.0	6596,708	=6030.5	261,280	-70,852	101,51	102,67	44,57
597.0	6595,714	=6053.9	261,193	-70,827	101,55	102,68	44,51
598.0	6594,715	=6077.3	261,107	-70,803	101,59	102,68	44,45
599.0	6593,713	=6100.7	261,020	-70,778	101,63	102,68	44,39
600.0	6592,707	=6124.1	260,934	-70,753	101,67	102,69	44,32
601.0	6591,697	=6147.6	260,847	-70,728	101,71	102,69	44,26
602.0	6590,684	=6171.0	260,761	-70,702	101,75	102,69	44,20
603.0	6589,666	=6194.5	260,675	-70,677	101,79	102,70	44,14
604.0	6588,645	=6218.0	260,588	-70,652	101,83	102,70	44,08
605.0	6587,620	=6241.5	260,502	-70,626	101,87	102,70	44,01
606.0	6586,590	=6265.0	260,415	-70,601	101,91	102,71	43,95
607.0	6585,557	=6288.5	260,329	-70,575	101,95	102,71	43,89
608.0	6584,520	=6312.1	260,242	-70,549	101,98	102,71	43,83
609.0	6583,480	=6335.6	260,156	-70,523	102,02	102,72	43,77
610.0	6582,435	=6359.2	260,069	-70,497	102,06	102,72	43,71
611.1	6581,295	=6384.9	259,975	-70,469	102,11	102,72	43,64
611.4	6580,932	=6393.0	259,945	-70,460	102,12	102,72	43,62

Table 4-10 (Continued)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

JOHANNESBURG, SOUTH AFRICA

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
611.4	6580,932	-6393.0	259,945	-70,460	102,12	102,72	43,62
620.0	6571,864	-6468.4	259,211	-70,234	101,77	102,72	42,94
630.0	6561,146	-6556.0	258,371	-69,967	101,36	102,71	42,16
650.0	6539,280	-6730.1	256,745	-69,424	100,54	102,71	40,66
660.0	6528,132	-6816.5	255,958	-69,147	100,14	102,71	39,94
670.0	6516,843	-6902.5	255,189	-68,868	101,55	101,08	39,45
690.0	6493,841	-7073.2	253,698	-68,301	103,62	97,42	11,28
710.0	6470,281	-7241.9	252,269	-67,724	104,64	93,46	351,98
730.0	6446,169	-7408.4	250,899	-67,137	104,62	89,51	332,66
750.0	6421,513	-7572.7	249,583	-66,540	103,65	85,85	313,47
760.0	6408,983	-7654.0	248,945	-66,239	102,86	84,19	303,96
770.0	6396,319	-7734.7	248,320	-65,935	102,86	84,61	303,49
790.0	6370,597	-7894.0	247,104	-65,323	102,88	85,46	302,59
800.0	6357,540	-7972.8	246,514	-65,013	102,89	85,88	302,16
900.0	6220,674	-8719.9	241,169	-61,833	102,98	90,11	298,42
1000.0	6070,967	-9385.3	236,647	-58,523	103,11	94,36	295,51
1100.0	5911,651	-9959.4	232,734	-55,118	103,27	98,62	293,24
1200.0	5743,679	-10436.5	229,276	-51,641	103,47	102,89	291,46
1300.0	5568,667	-10815.0	226,163	-48,105	103,70	107,18	290,06
1375.7	5432,577	-11036.5	223,986	-45,397	103,90	110,43	289,21
1400.0	5388,230	-11096.2	223,312	-44,520	103,97	111,48	288,97
1410.0	5369,949	-11119.1	223,038	-44,159	104,00	111,91	288,88
1420.0	5351,631	-11141.1	222,767	-43,797	104,03	112,35	288,79
1430.0	5333,278	-11162.1	222,497	-43,435	104,06	112,78	288,70
1440.0	5314,890	-11182.3	222,230	-43,073	104,09	113,21	288,61
1450.0	5296,471	-11201.5	221,964	-42,710	104,12	113,64	288,53
1455.0	5287,249	-11210.7	221,831	-42,528	104,14	113,86	288,49
1460.0	5278,020	-11219.8	221,699	-42,346	104,15	114,08	288,45
1465.0	5268,784	-11228.6	221,568	-42,164	104,17	114,29	288,41
1470.0	5259,540	-11237.2	221,437	-41,982	104,18	114,51	288,37
1475.0	5250,290	-11245.5	221,306	-41,800	104,20	114,73	288,33
1480.0	5241,033	-11253.7	221,176	-41,618	104,21	114,94	288,29
1485.0	5231,769	-11261.6	221,046	-41,436	104,23	115,16	288,26
1490.0	5222,498	-11269.3	220,916	-41,253	104,25	115,38	288,22
1495.0	5213,222	-11276.7	220,787	-41,071	104,26	115,59	288,18
1495.7	5212,012	-11277.7	220,770	-41,047	104,26	115,62	288,18
1500.0	5203,939	-11284.0	220,658	-40,888	104,28	115,81	288,15
1505.0	5194,651	-11291.0	220,530	-40,705	104,29	116,03	288,11
1510.0	5185,357	-11297.8	220,402	-40,522	104,31	116,25	288,08
1515.0	5176,057	-11304.4	220,274	-40,339	104,33	116,46	288,04
1520.0	5166,752	-11310.7	220,147	-40,156	104,34	116,68	288,01

Table 4-10 (Concluded)

AE-C SPACECRAFT MISSION
RADAR PARAMETERS

JOHANNESBURG, SOUTH AFRICA

TIME SEC	D • N MI	D DOT • FT/SEC	A • DEG	E • DEG	TAU SUB T DEG	TAU SUB R DEG	TAU SUB P DEG
1525.0	5157,442	-11316.9	220,020	-39,973	104,36	116,90	287,98
1530.0	5148,127	-11322.8	219,893	-39,789	104,38	117,12	287,95
1535.0	5138,807	-11328.5	219,767	-39,606	104,39	117,33	287,91
1540.0	5129,483	-11334.0	219,641	-39,422	104,41	117,55	287,88
1545.0	5120,154	-11339.3	219,515	-39,239	104,43	117,77	287,85
1550.0	5110,821	-11344.3	219,390	-39,055	104,44	117,99	287,82
1650.0	4923,531	-11401.7	216,945	-35,353	104,81	122,37	287,32
1750.0	4735,960	-11379.6	214,592	-31,600	105,20	126,80	287,02
1850.0	4549,368	-11283.6	212,301	-27,792	105,64	131,29	286,90
1950.0	4364,927	-11119.0	210,045	-23,919	106,10	135,86	286,95
2050.0	4183,728	-10890.2	207,798	-19,976	106,61	140,52	287,19
2062.3	4161,773	-10857.9	207,522	-19,486	106,67	141,10	287,23
2150.0	4006,799	-10600.7	205,536	-15,952	107,14	145,28	287,61
2250.0	3835,119	-10252.8	203,234	-11,839	107,71	150,18	288,23
2350.0	3669,633	-9848.0	200,867	-7,630	108,30	155,21	289,08
2450.0	3511,272	-9387.1	198,404	-3,317	108,92	160,42	290,17
2550.0	3360,958	-8870.0	195,812	1,104	109,55	165,81	291,54
2636.1	3238,700	-8379.5	193,449	4,997	110,10	170,61	292,97
2650.0	3219,618	-8296.4	193,053	5,633	110,19	171,40	293,23
2750.0	3088,187	-7665.9	190,081	10,266	110,82	177,22	295,29
2850.0	2967,600	-6978.7	186,839	14,987	111,44	183,27	297,78
2908.9	2901,990	-6547.6	184,775	17,801	111,78	186,95	299,48
2950.0	2858,783	-6236.0	183,258	19,772	112,01	189,56	300,77
3050.0	2762,628	-5440.5	179,255	24,581	112,52	196,08	304,34
3150.0	2679,965	-4597.5	174,727	29,355	112,95	202,84	308,59
3250.0	2611,515	-3714.8	169,553	34,011	113,27	209,78	313,63
3350.0	2557,850	-2803.0	163,598	38,441	113,47	216,89	319,57
3450.0	2519,341	-1875.3	156,728	42,506	113,53	224,10	326,52
3550.0	2496,127	-946.9	148,847	46,042	113,43	231,35	334,56
3650.0	2488,090	-83.6	139,551	48,873	113,17	238,59	343,64
3750.0	2494,854	849.3	130,202	50,833	112,77	245,73	353,58
3850.0	2515,806	1688.5	119,960	51,811	112,24	252,73	3,99
3950.0	2550,134	2473.4	109,736	51,782	111,60	259,53	14,33
4050.0	2596,883	3196.9	100,037	50,817	110,87	266,10	24,09
4150.0	2655,006	3855.2	91,228	49,064	110,08	272,41	32,88
4250.0	2723,419	4447.6	83,471	46,699	109,24	278,46	40,56
4350.0	2801,048	4975.6	76,765	43,892	108,38	284,24	47,11
4450.0	2886,861	5442.8	71,014	40,786	107,52	289,77	52,64
4550.0	2979,893	5853.7	66,084	37,491	106,67	295,05	57,30
4602.3	3031,168	6048.0	63,786	35,719	106,22	297,72	59,44

FIGURE 4-1

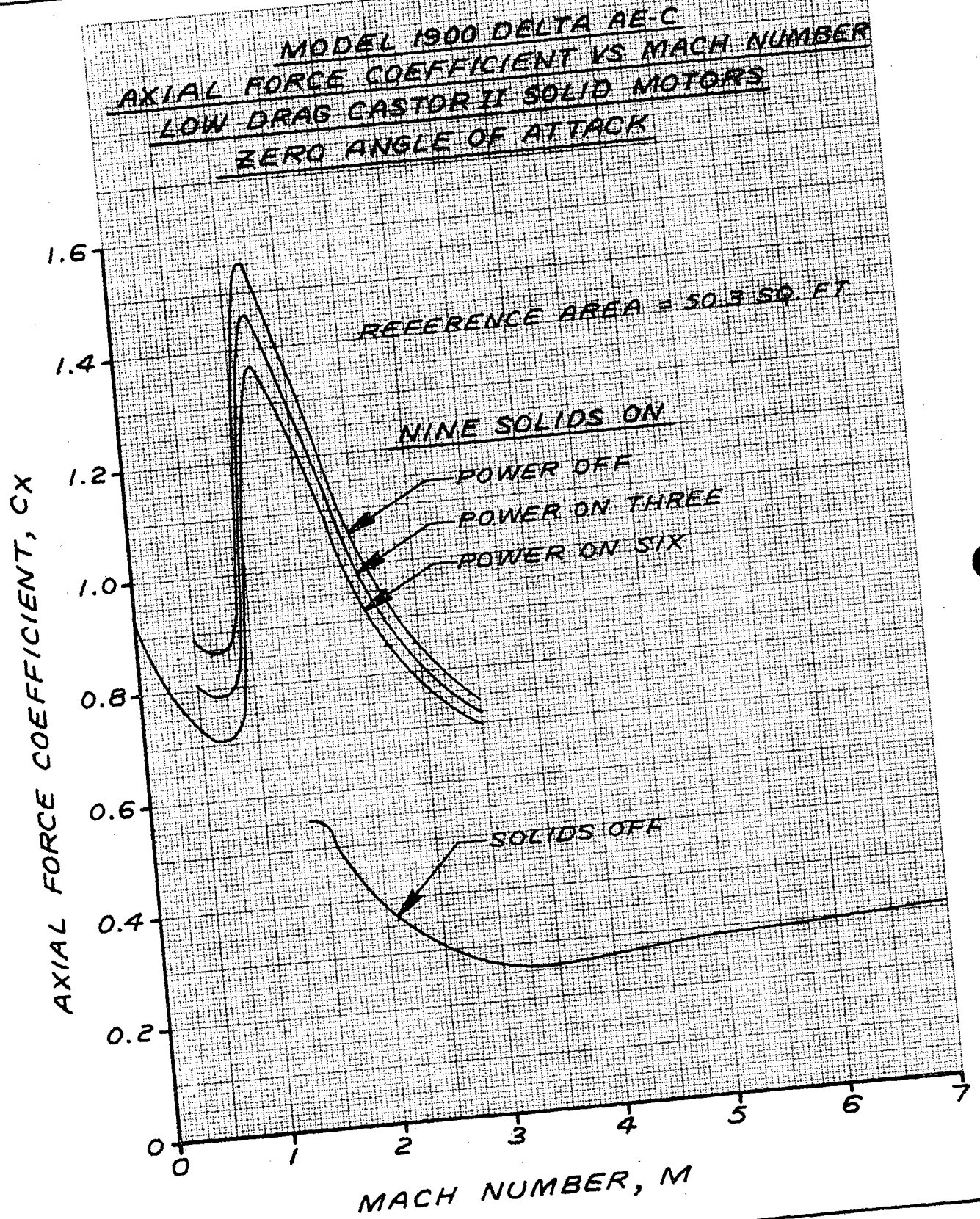


FIGURE 4-2

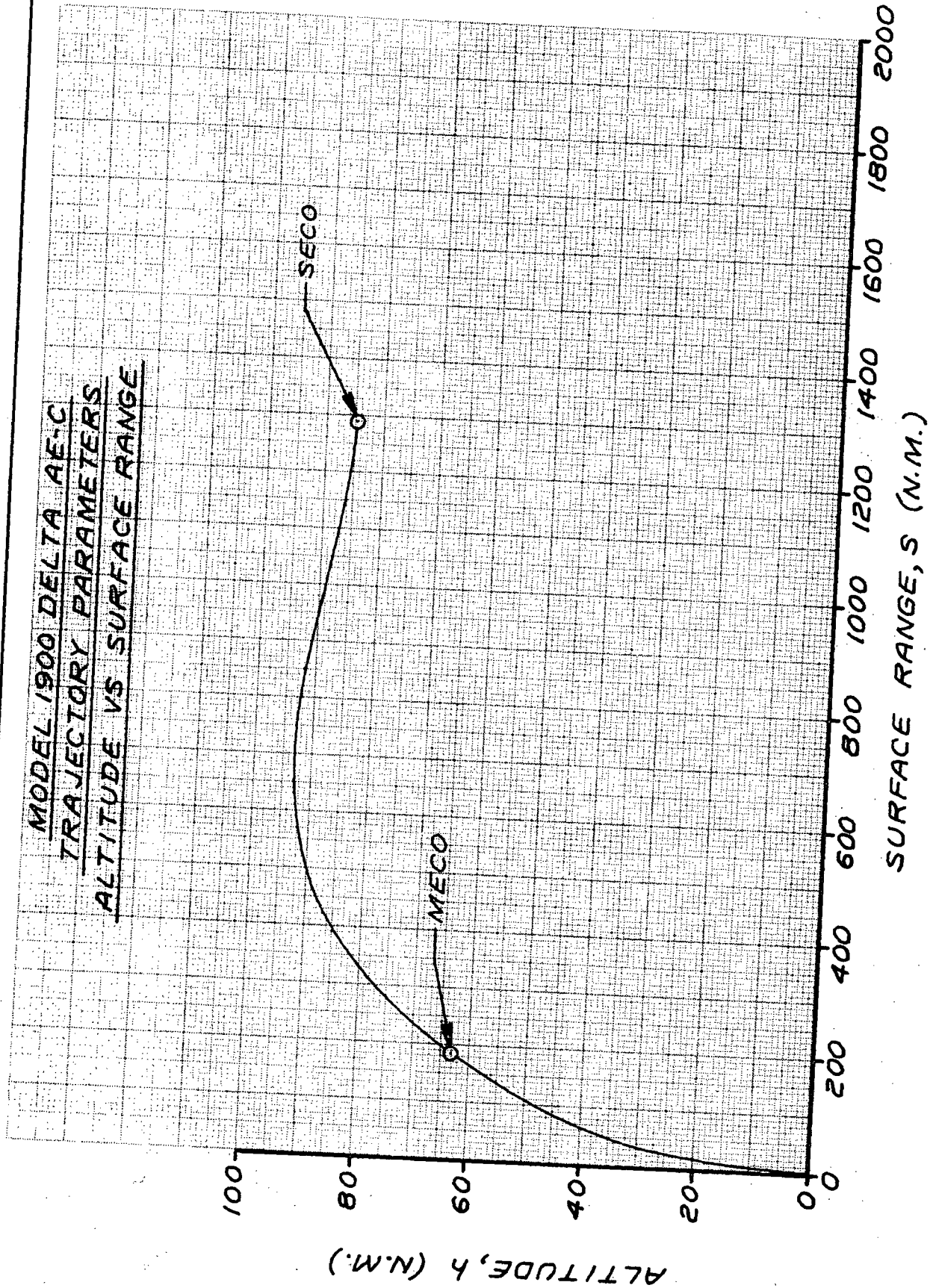


FIGURE 4-3

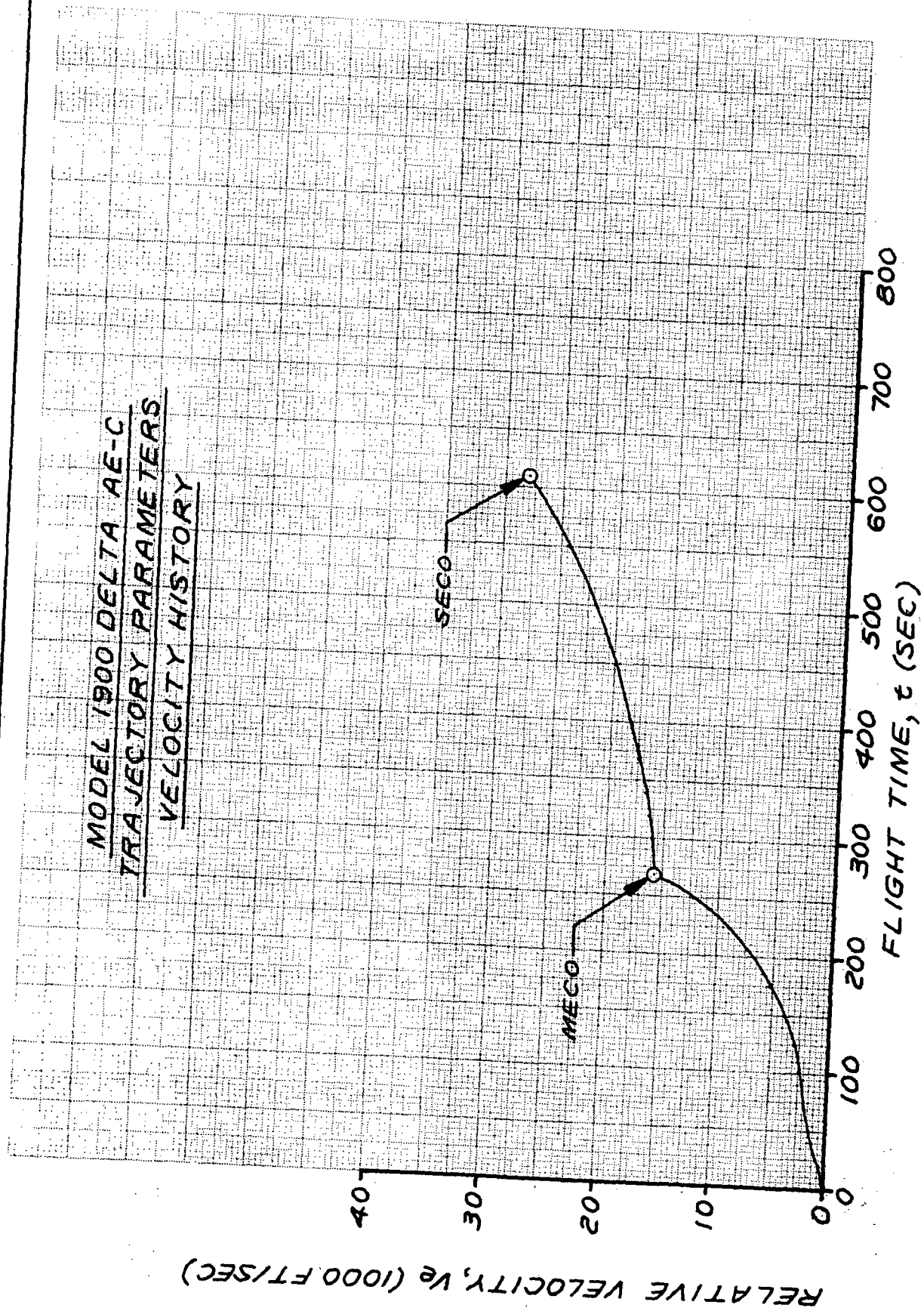


FIGURE 4-4

MODEL 1900 DELTA AE-C
TRAJECTORY PARAMETERS
HISTORY OF ACCELERATION
ALONG VEHICLE CENTERLINE

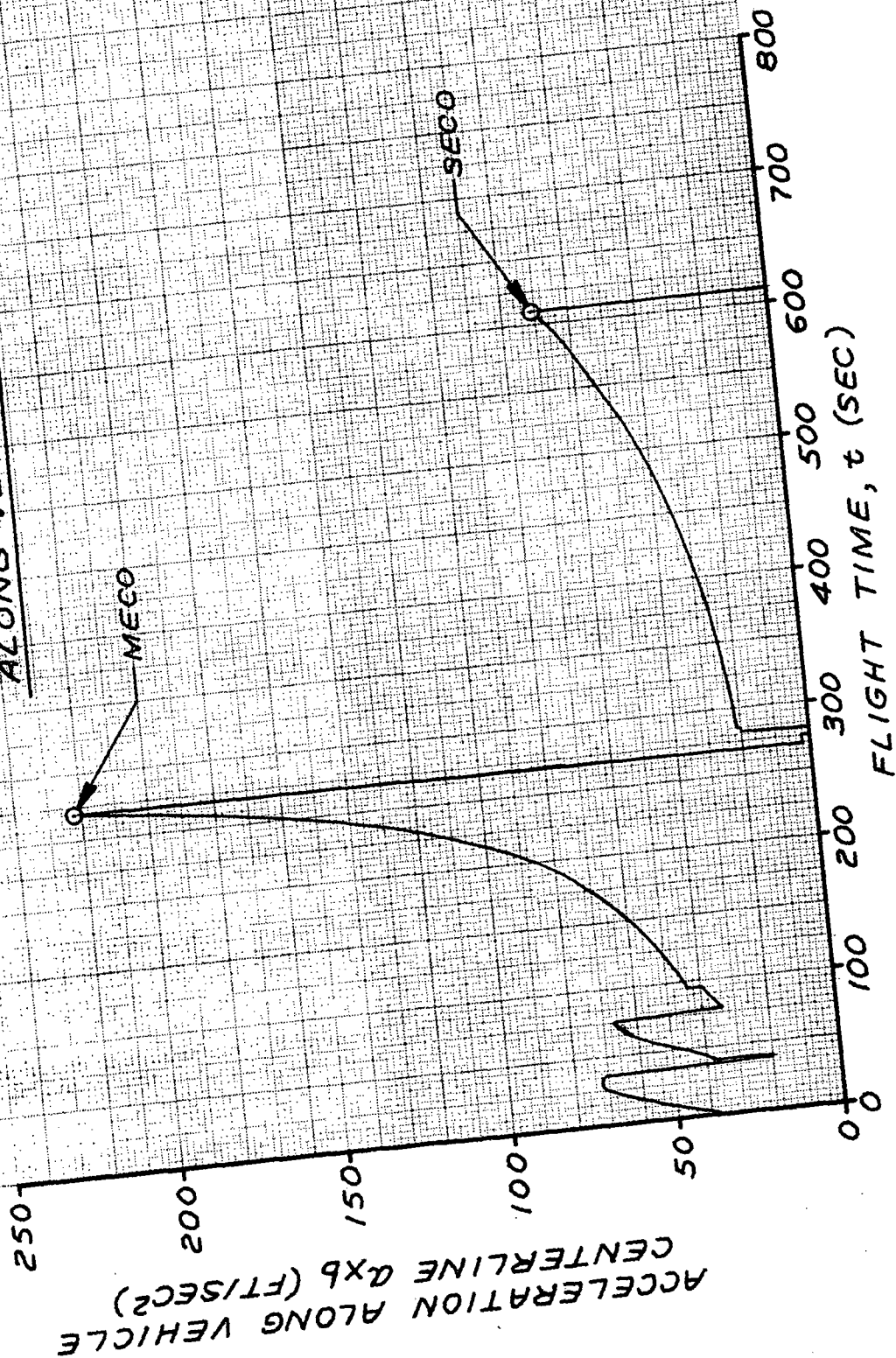


FIGURE 4-5

1900 DELTA VEHICLE
 AE-C SPACECRAFT MISSION
 BOOST PHASE ENVIRONMENTAL PARAMETERS

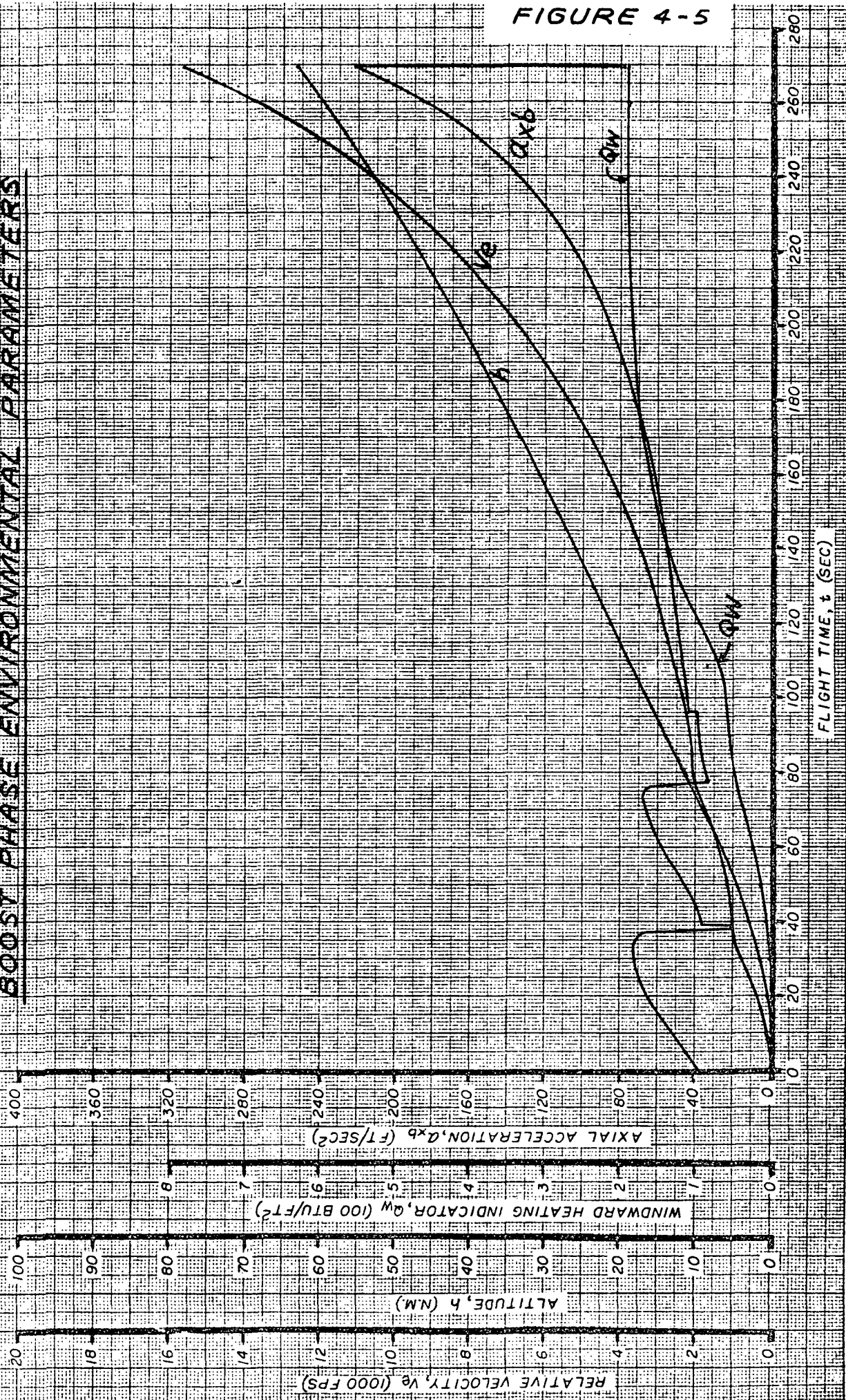


FIGURE 4-6

1800 DELTA VEHICLE
AE-C SPACECRAFT MISSION
BOOST PHASE ENVIRONMENTAL PARAMETERS

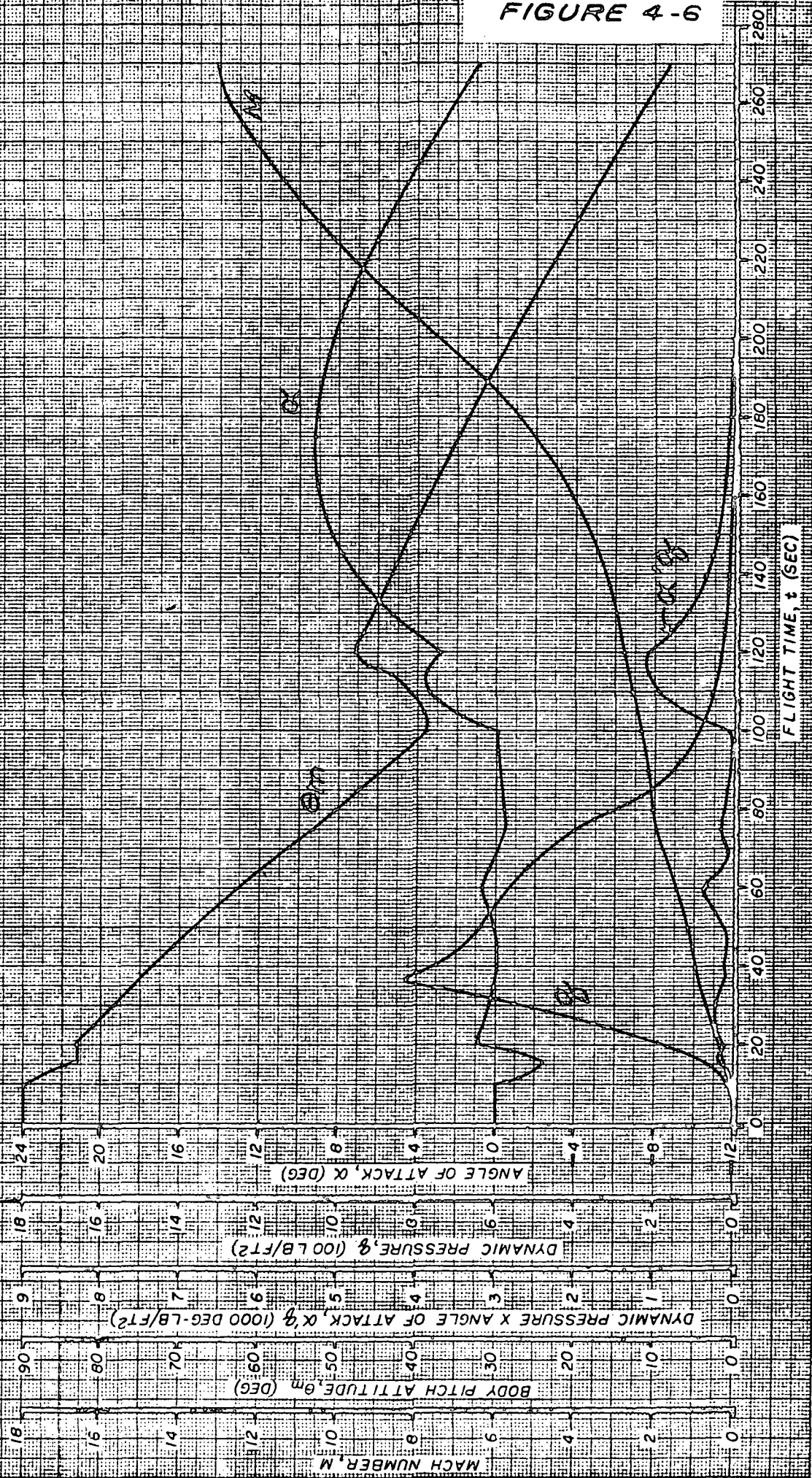
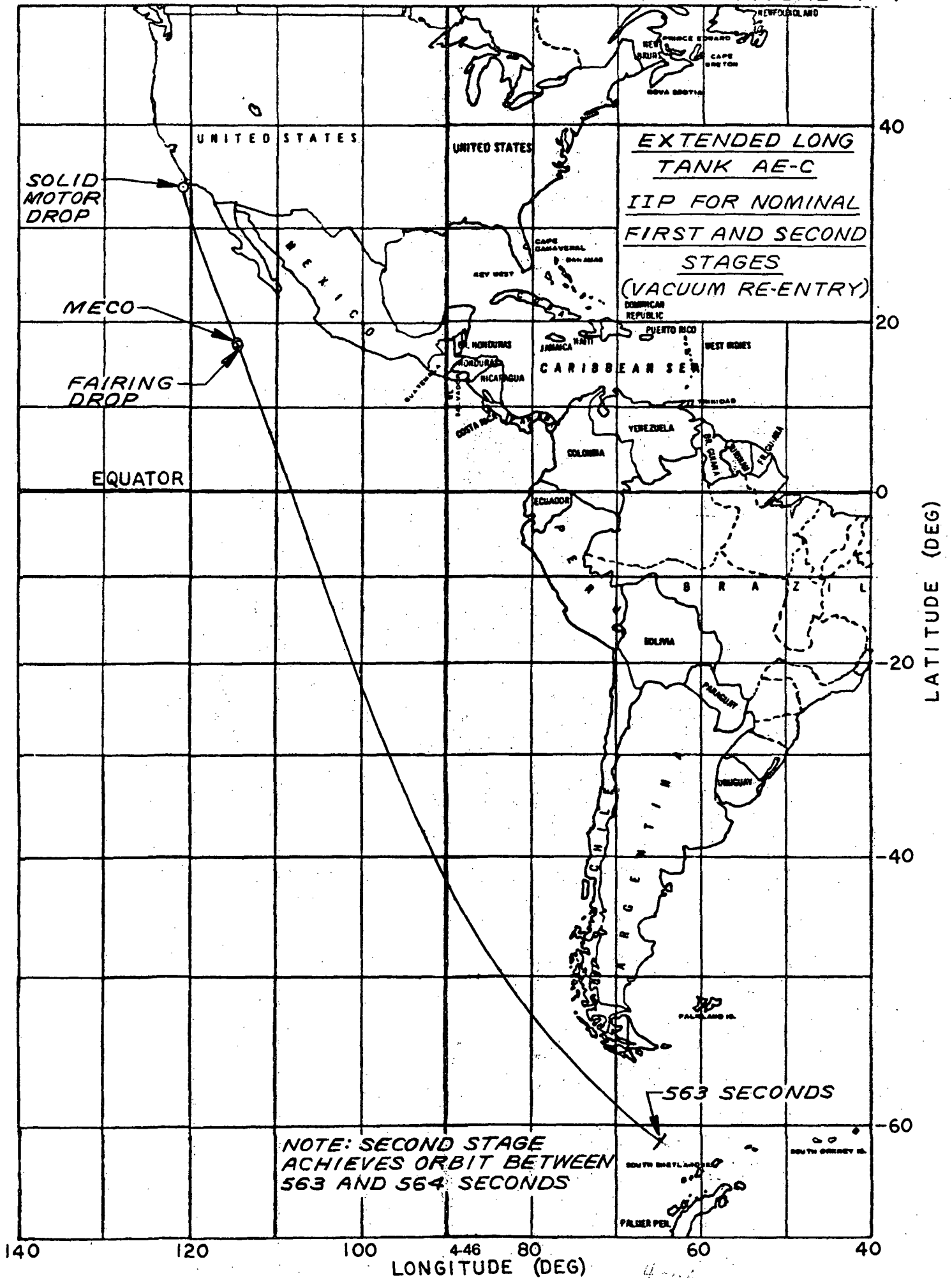


FIGURE 4-7



Section 5

SEQUENCE OF EVENTS

The current sequence of events table for the AE-C mission has not been completed at the time of publication of this DTO report; it will be transmitted to NASA when it becomes available.

Section 6

DTO WEIGHT SUMMARY AND INFLIGHT MASS PROPERTIES HISTORY

Table 6-1 is a DTO weight summary for the AE-C mission; the spacecraft mass properties presented in the table are taken from Mission Specification No. 203-02-00077, Revision Letter D. Table 6-1 was prepared subsequent to the DTO trajectory simulation. Table 3-5 reflects the weights used in the DTO trajectory simulation.

Figures 6-1 through 6-10 provide an inflight mass properties history in graphical form for the AE-C mission. Major events depicted in these figures are indicated below:

<u>ITEM</u>	<u>TIME (SECONDS)</u>
Liftoff	0.000
Solid Motor Burnout (6)	38.614
Solid Motor Ignition (3)	39.000
Solid Motor Burnout (3)	77.814
Solid Motor Jettison (9)	96.000
MECO	269.559
VECO	275.559
Second Stage Ignition	281.559
Fairing Jettison	285.000
SECOM	611.087

Table 6-1
 DTO WEIGHT SUMMARY
 AE-C CONFIG. 1900

ITEM	WEIGHT (LBS)	WEIGHT (LBS)
8. SECOND STAGE USEFUL LOAD		1,549.68
AE-C Spacecraft	1,500.00	
Payload Attach Fitting	14.48	
Spintable Adapter (1B08160-1)	15.03	
Attach Fitting Adapter (1B95984-1)	20.17	
9. DRY SECOND STAGE DSV-3N-5 (S/N 20009) (LESS ABLATIVES)		1,746.10
10. TRAPPED PROPELLANTS		15.26
Fuel	6.22	
Oxidizer	9.04	
11. HELIUM (2 BOTTLE SYSTEM)		20.34
12. NITROGEN RESERVE (6 BOTTLE SYSTEM)		12.19
13. PROPELLANT RESERVE		227.37
Fuel	69.88	
Fuel Bias	27.00	
Oxidizer	130.49	
22. NITROGEN USED DURING COAST & FIRST BURN		3.95
24. TCA BOILOFF		3.21
Fuel	1.30	
Oxidizer	1.91	
25. SECOND STAGE ENGINE CUTOFF		3,578.10
26. STOP TRANSIENT		5.83
Fuel	2.01	
Oxidizer	3.82	
23. ABLATIVE EXPENDABLES		7.10

Table 6-1 (Continued)

DTO WEIGHT SUMMARY

AE-C CONFIG. 1900

ITEM	WEIGHT (LBS)	WEIGHT (LBS)
27. PROPELLANT CONSUMED		10,063.88
Fuel	3,469.16	
Oxidizer	6,594.72	
28. FAIRING DSV-3E-7 (S/N 20251)		544.60
29. START TRANSIENT		3.11
Fuel	1.00	
Oxidizer	2.11	
30. SECOND STAGE IGNITION		14,202.62
31. FIRST TO SECOND STAGE ADAPTER DSV-3N-2A (S/N 20008)		258
32. DRY BOOSTER DSV-3N-1A (S/N 20008) (585)		9,246
33. TRAPPED PROPELLANTS AND GASES		998
Fuel	176	
Liquid Oxygen	125	
Gaseous Oxygen	573	
Gaseous Nitrogen	117	
FABU Lube and/or Fuel	6	
Helium (POGO)	1	
34. RESIDUAL PROPELLANTS		362
Fuel	361	
Liquid Oxygen	1	
35. RESIDUAL VERNIER PROPELLANTS		54
Fuel (Includes 11 pounds vernier refill)	25	
Liquid Oxygen (Includes 7 pounds vernier refill)	29	

Table 6-1 (Continued)

DTO WEIGHT SUMMARY

AE-C CONFIG. 1900

ITEM	WEIGHT (LBS)	WEIGHT (LBS)
36. VERNIER ENGINE CUTOFF		25,121
37. VERNIER PROPELLANT CONSUMED		44
Fuel	16	
Liquid Oxygen	28	
38. MAIN ENGINE STOP LOSSES		66
Fuel	22	
Liquid Oxygen	44	
39. MAIN ENGINE CUTOFF		25,231
40. LIQUID PROPELLANTS CONSUMED		177,921
Fuel	58,265	
Liquid Oxygen	119,656	
41. LIQUID PROPELLANTS & GASES VENTED		196
Fuel Overflow	15	
Liquid Oxygen Overflow	40	
Gaseous Oxygen Vented	141	
42. SOLID MOTOR CASES (6) (FIRST BURN)		9,558
Solid Motor Cases (6)	8,826	
MDAC Modifications	414	
Cork Insulation	318	
43. SOLID MOTOR CASES (3) (SECOND BURN)		4,779
Solid Motor Cases (3)	4,413	
MDAC Modifications	207	
Cork Insulation	159	
44. SOLID MOTOR PROPELLANTS & INERTS CONSUMED (6) (FIRST BURN)		49,578
Propellants	49,218	
Inert Loss During Burning	360	

Table 6-1 (Concluded)

DTO WEIGHT SUMMARY

AE-C CONFIG. 1900

ITEM	WEIGHT (LBS)	WEIGHT (LBS)
45. SOLID MOTOR PROPELLANT & INERTS CONSUMED (3) (SECOND BURN)		24,846
Propellants	24,660	
Inert Loss During Burning	180	
Pyrogen	6	
47. SOLID MOTOR NOZZLE PLUGS (3) (SECOND BURN)		22
48. LIFTOFF		292,131

PROPELLANT DATA

<u>ITEM</u>	<u>WEIGHT (LBS)</u>	<u>DENSITY (LBS/FT³)</u>
<u>FIRST STAGE</u>		
Oxidizer in tank at liftoff	120,419	70.4426
Fuel in tank at liftoff	58,652	53.1700
<u>SECOND STAGE</u>		
Oxidizer loaded	6,742.09	90.142
Fuel loaded	3,576.57	56.376

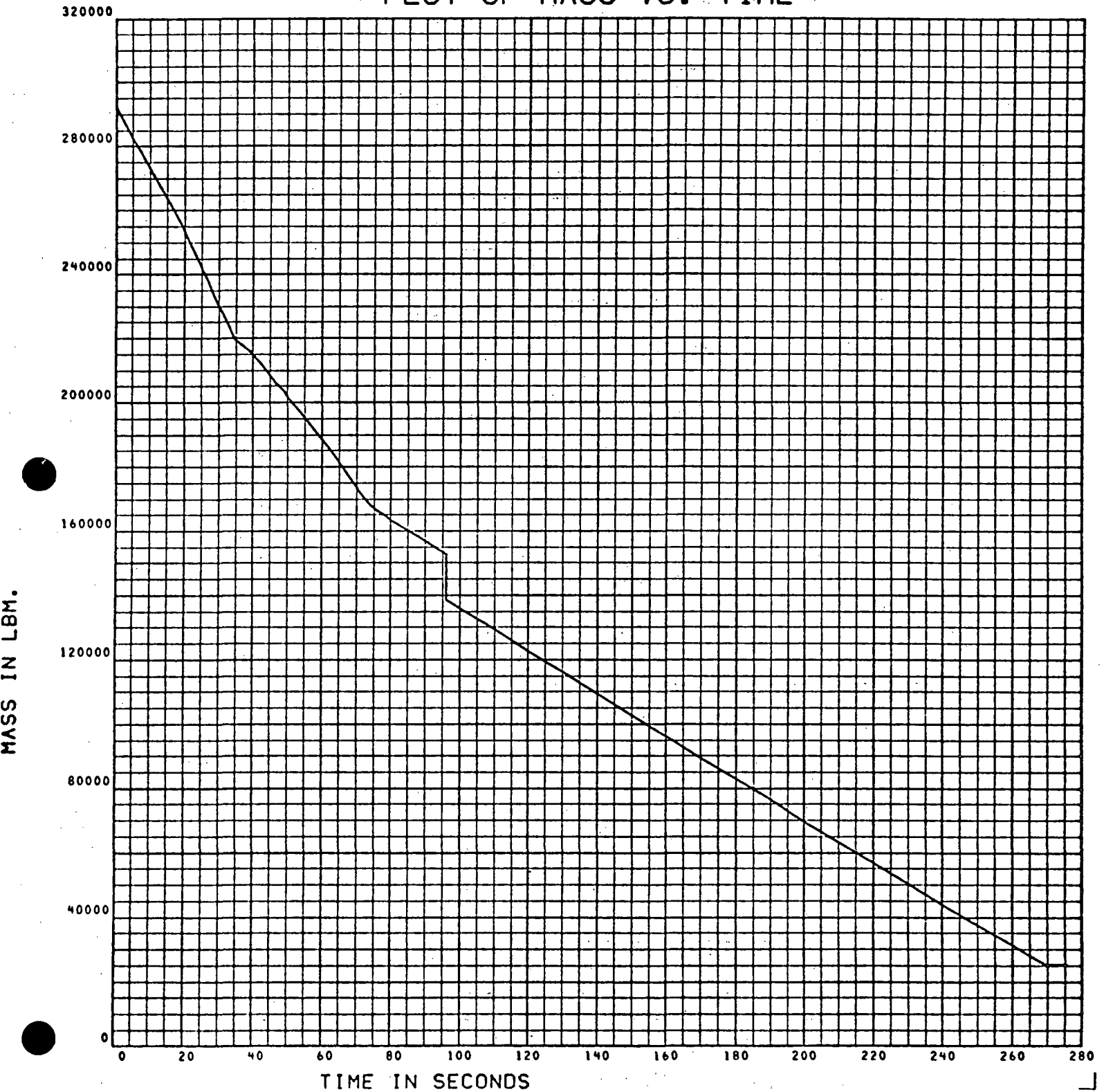
FIGURE 6-1

TOTAL VEHICLE
PLOT OF MASS VS. TIME

SERIAL A01045

108

17



TOTAL VEHICLE CENTER OF GRAVITY

PLOT OF X ARM VS. TIME

SERIAL A01045

109

27

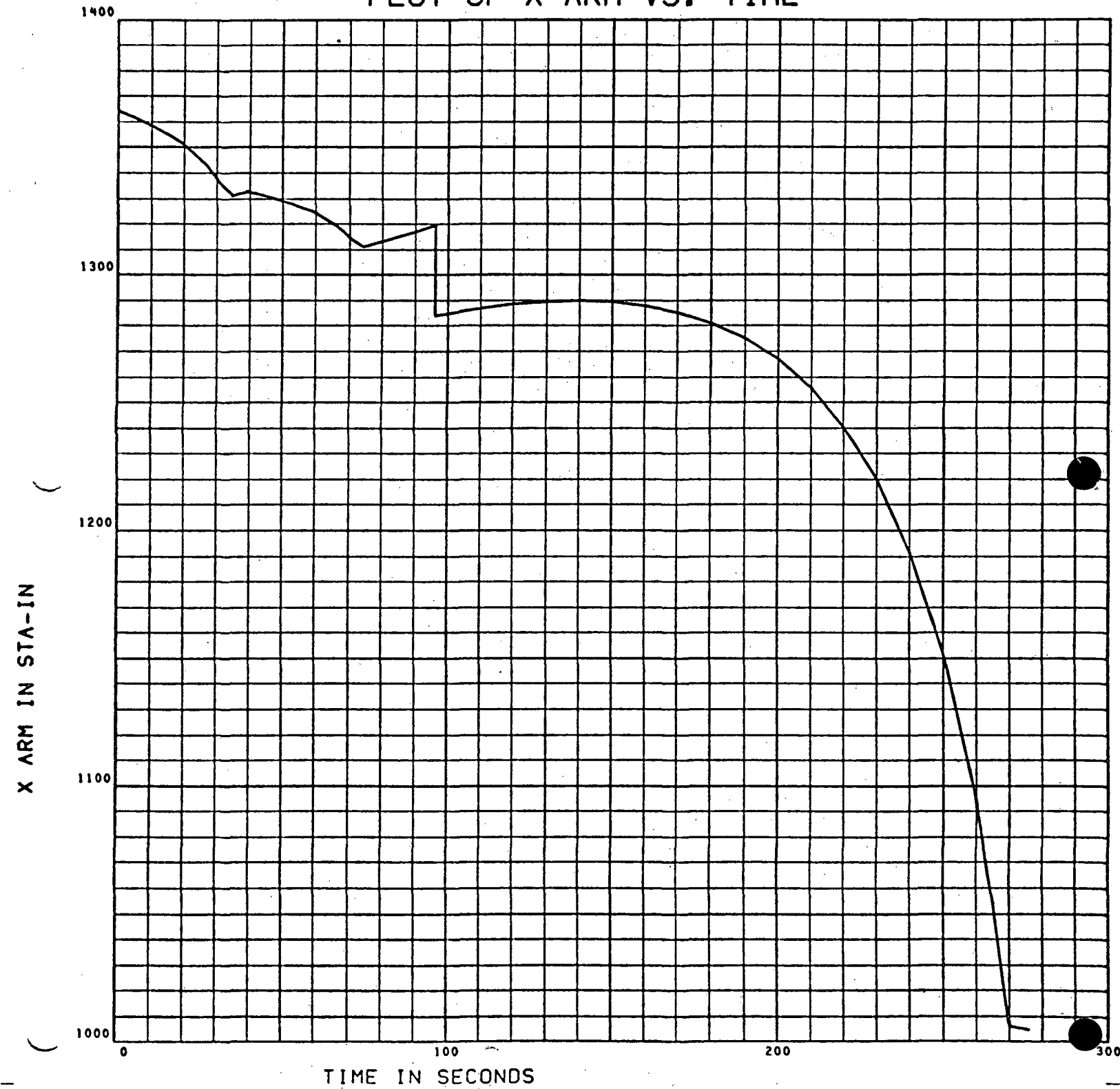


FIGURE 6-3

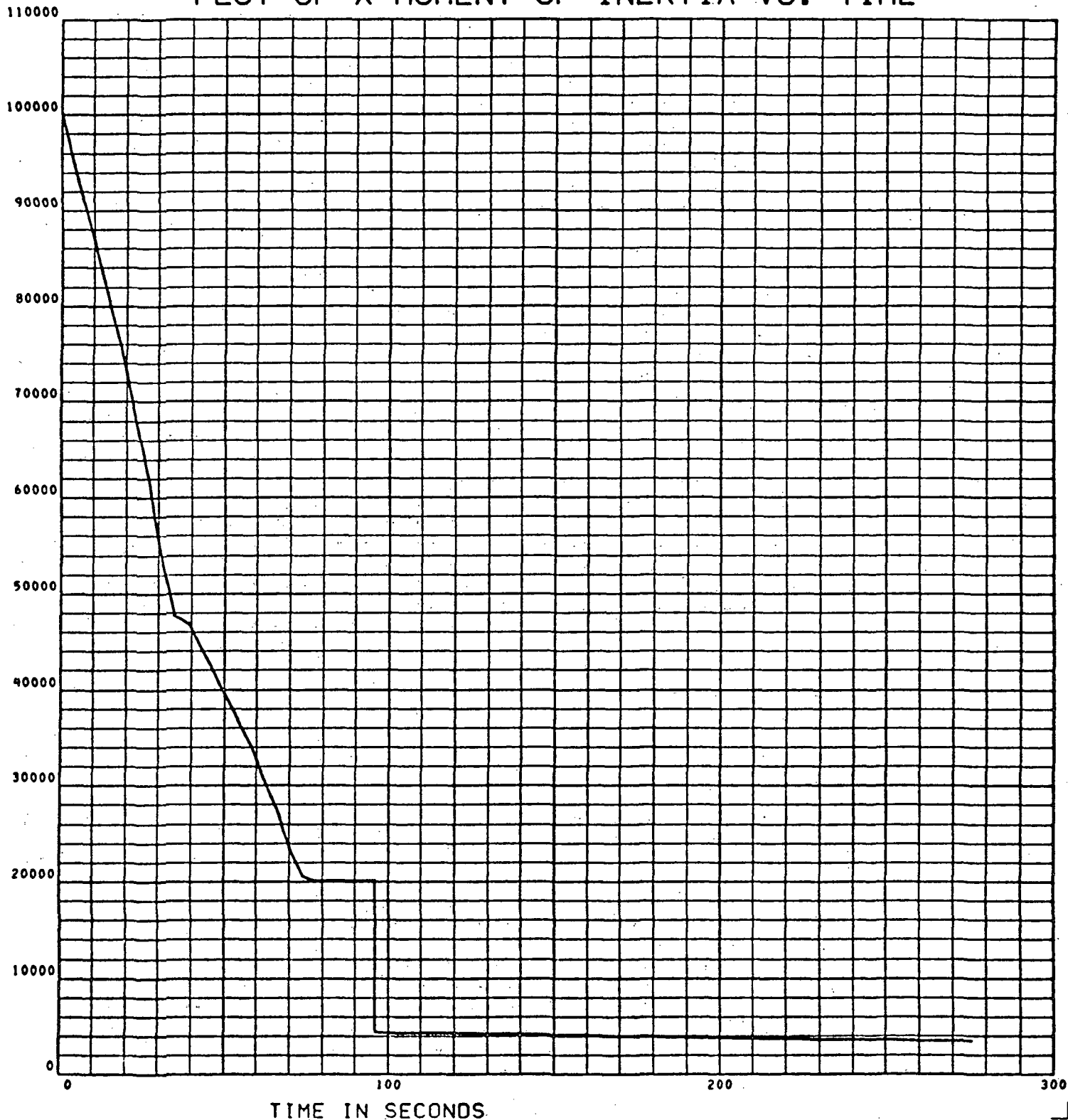
TOTAL VEHICLE ROLL MOMENT OF INERTIA
PLOT OF X MOMENT OF INERTIA VS. TIME

SERIAL A01045

112

57

X MOMENT OF INERTIA IN SLUG-FT²



TIME IN SECONDS

FIGURE 6-4

TOTAL VEHICLE PITCH MOMENT OF INERTIA
 PLOT OF Y MOMENT OF INERTIA VS. TIME

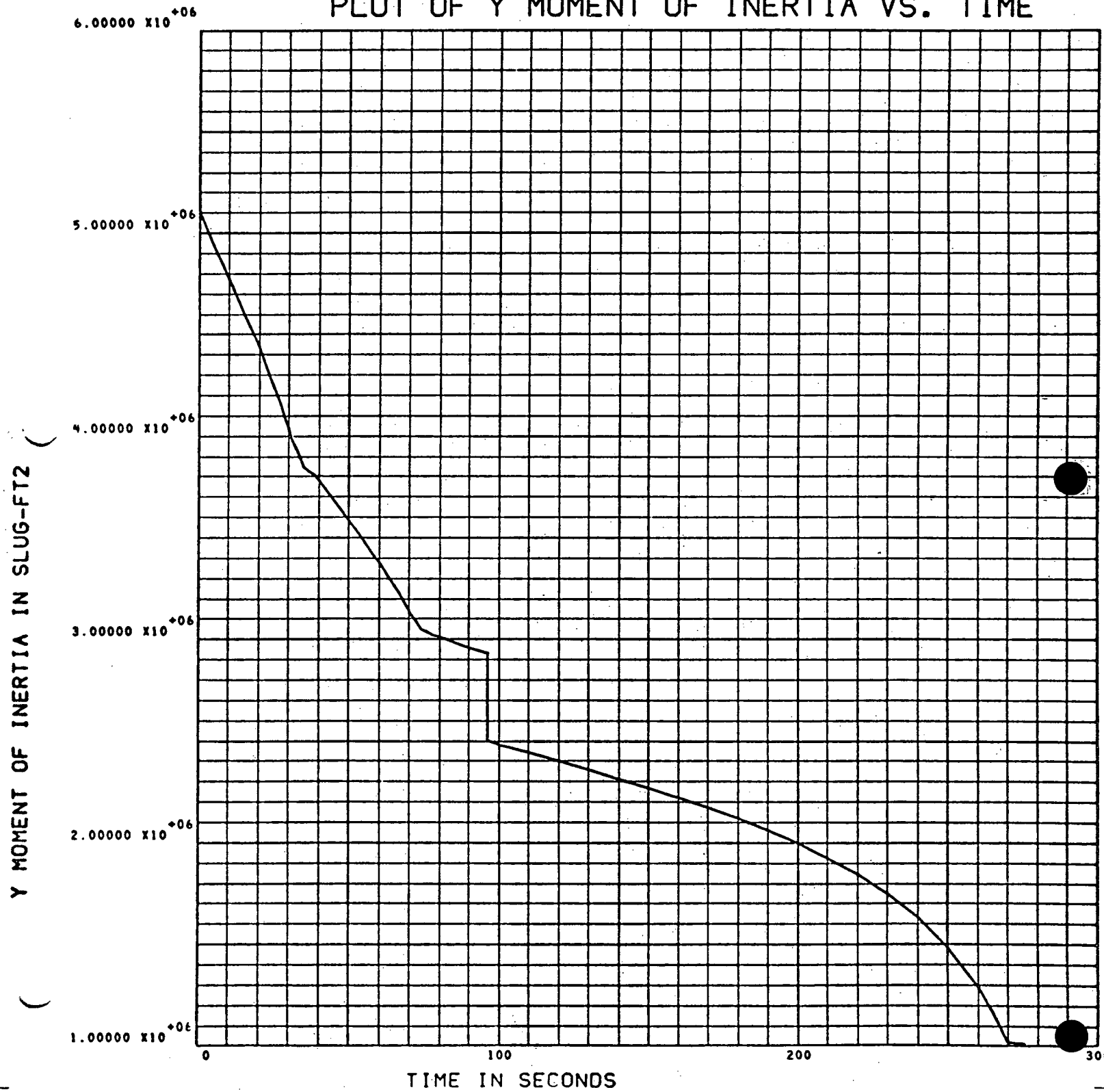


FIGURE 6-5

TOTAL VEHICLE YAW MOMENT OF INERTIA
PLOT OF Z MOMENT OF INERTIA VS. TIME

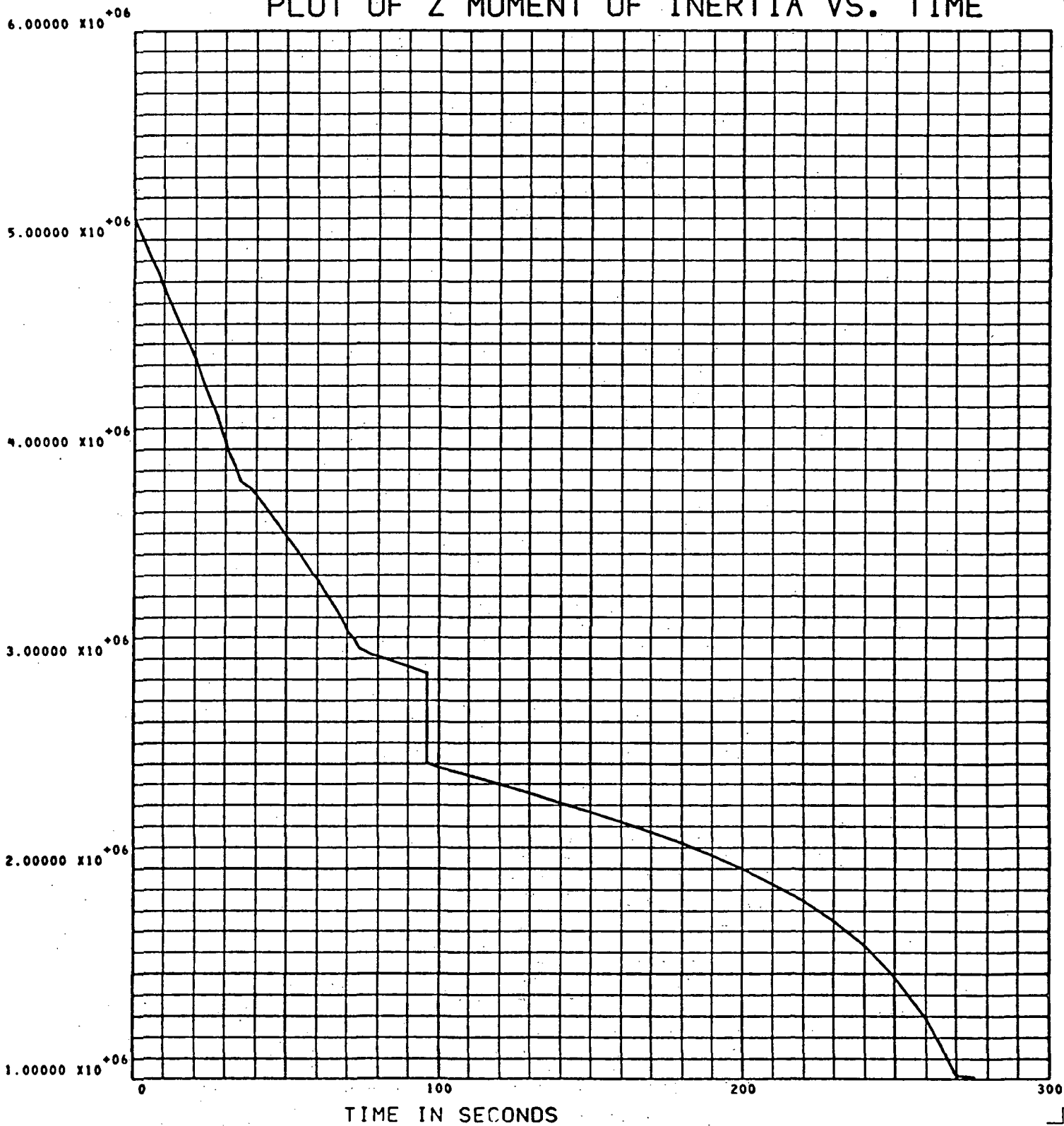


FIGURE 6-6

STAGE II AND PAYLOAD

PLOT OF MASS VS. TIME

SERIAL A01045

115

8

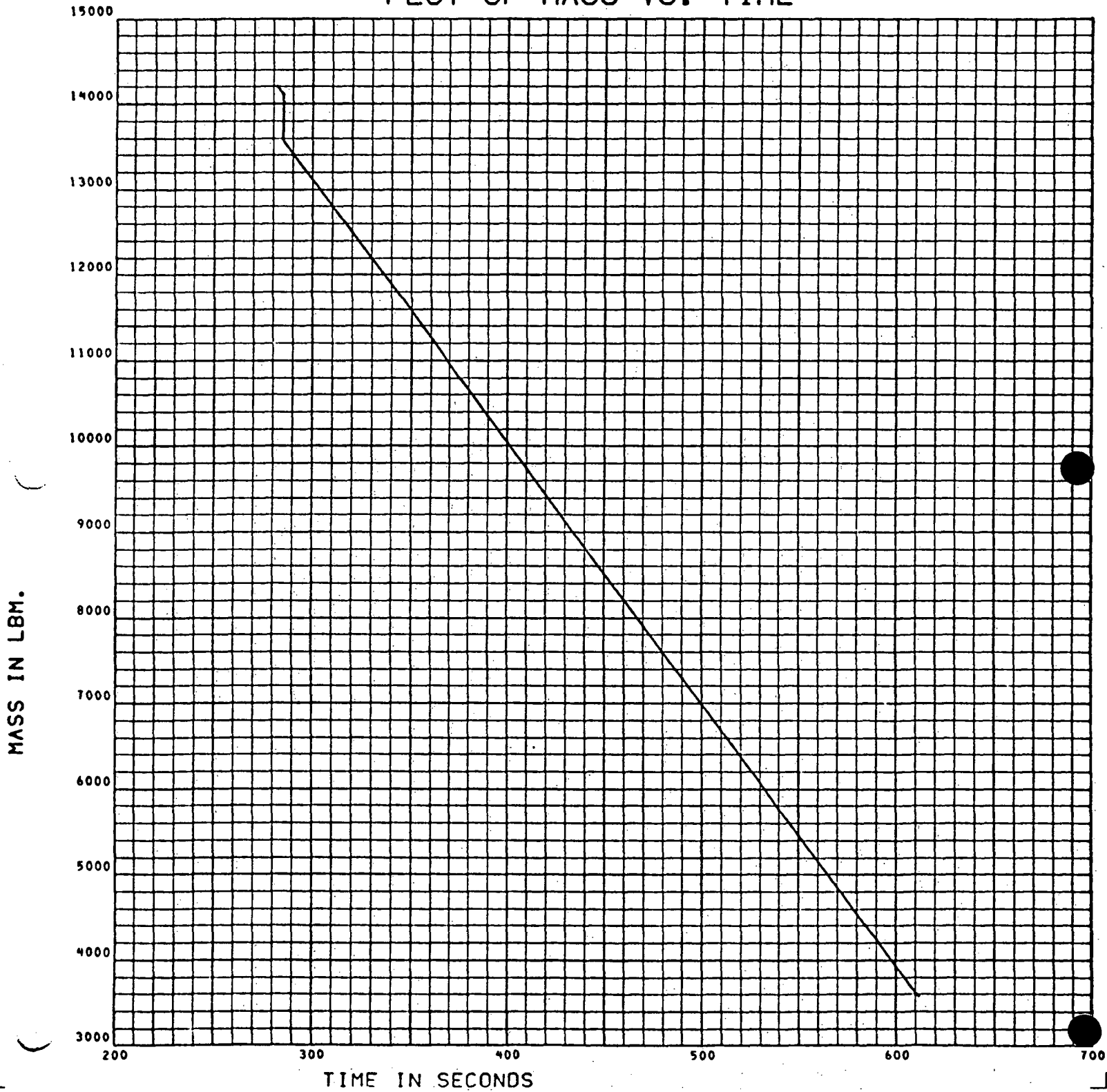


FIGURE 6-7

STAGE II AND PAYLOAD CENTER OF GRAVITY

PLOT OF X ARM VS. TIME

SERIAL A01045

116

97

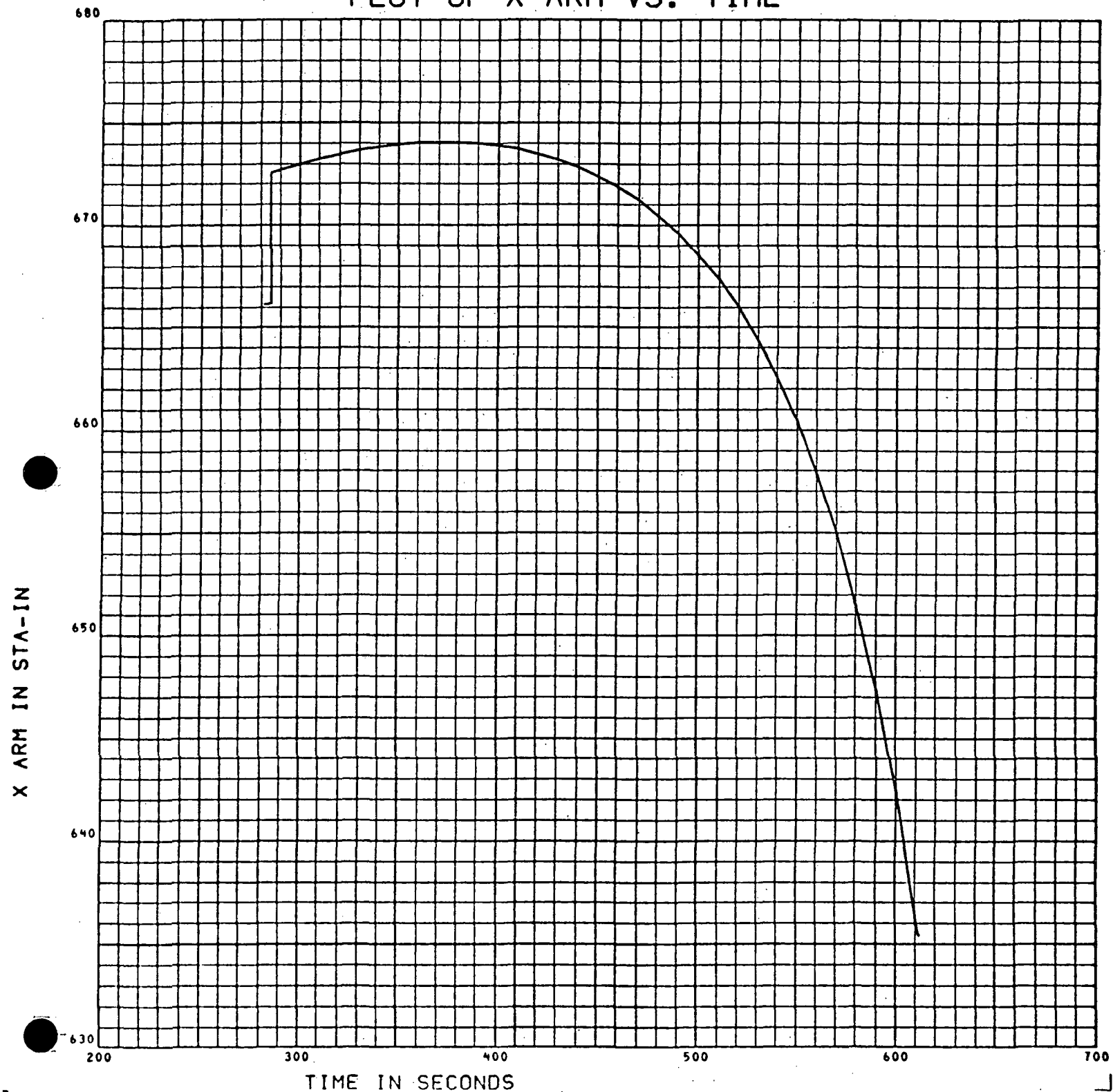


FIGURE 6-8

STAGE II AND PAYLOAD ROLL MOMENT OF INERTIA

PLOT OF X MOMENT OF INERTIA VS. TIME

SERIAL 401045

119

12

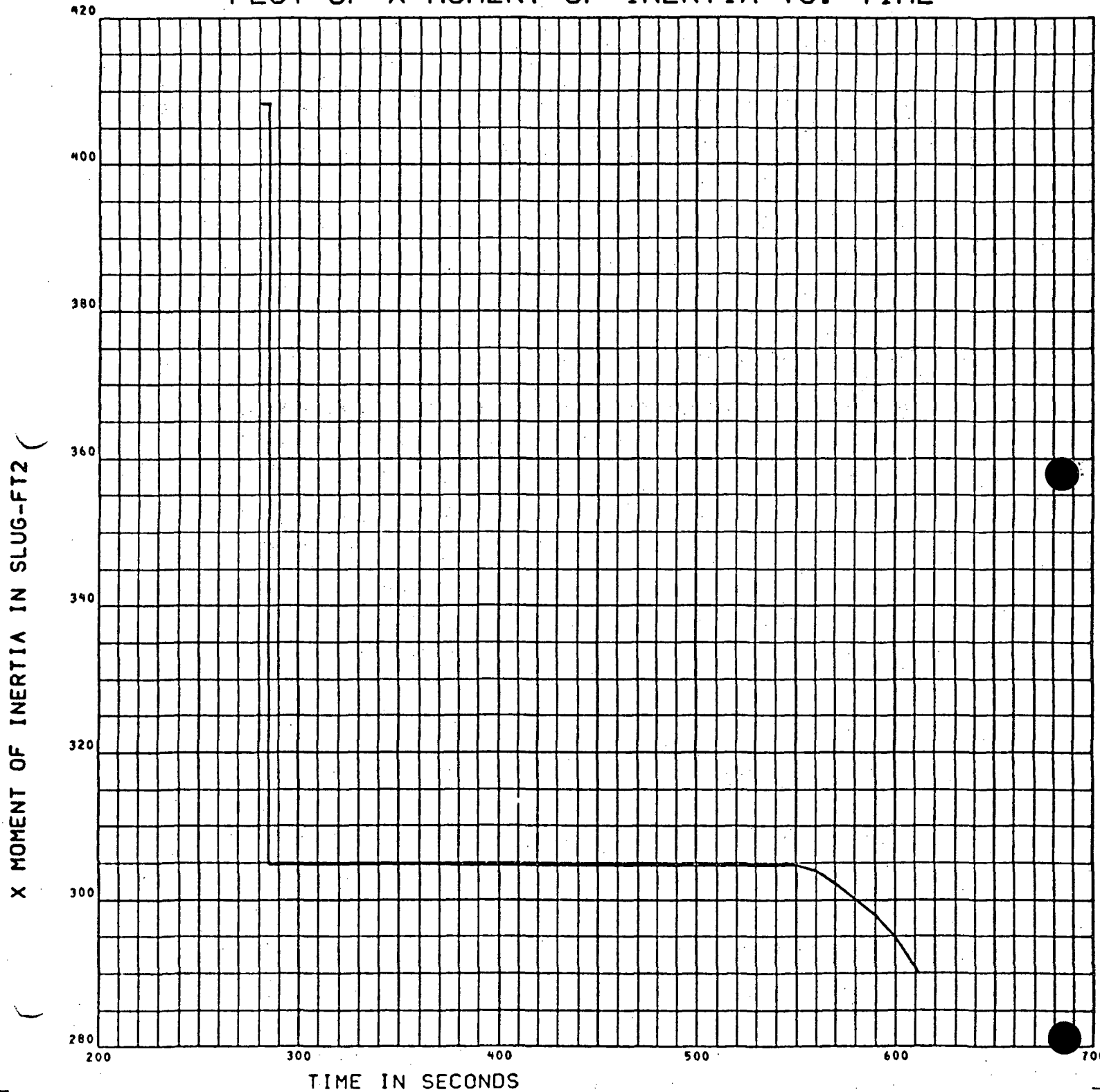


FIGURE 6-9

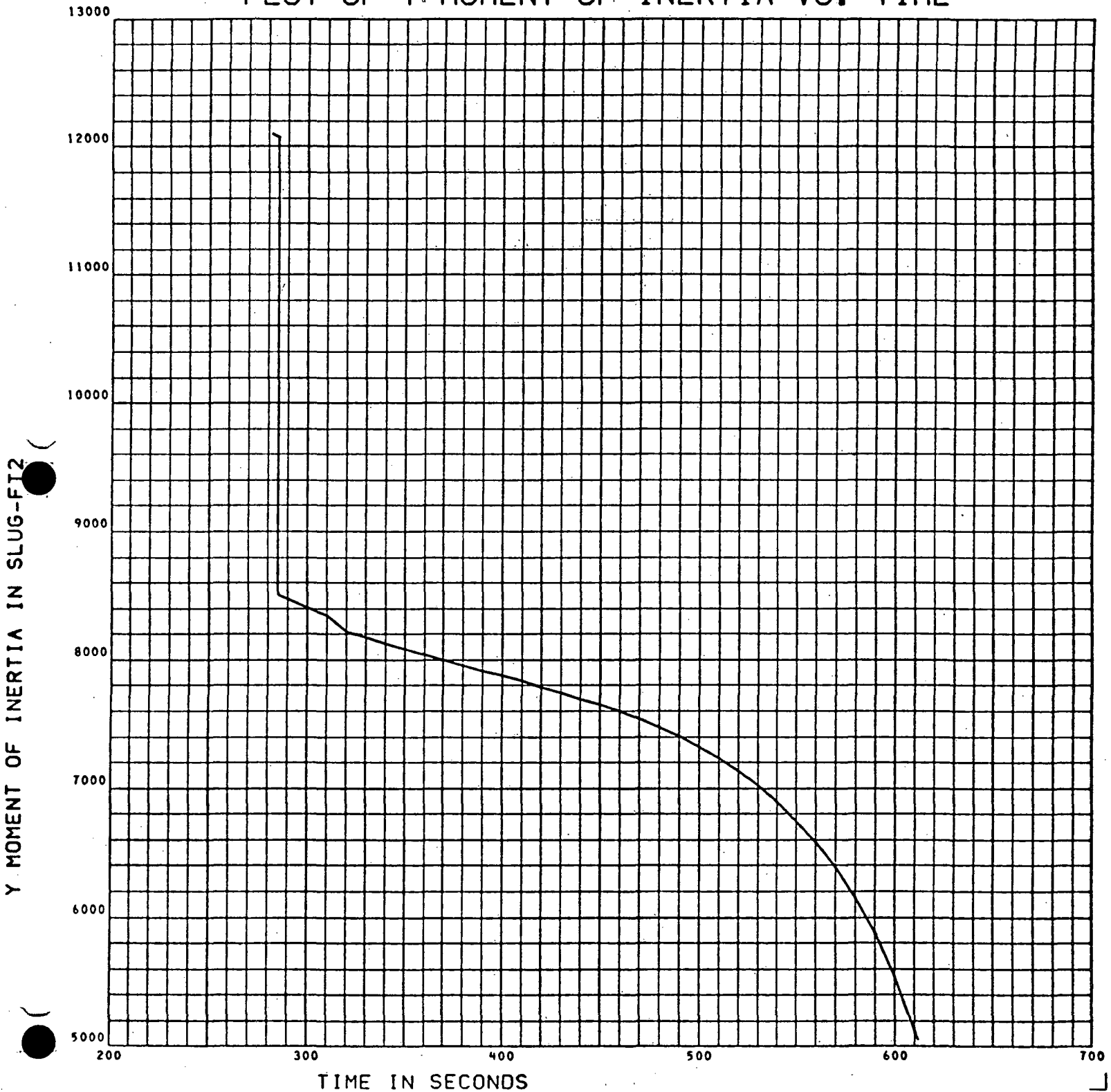
STAGE II AND PAYLOAD PITCH MOMENT OF INERTIA

PLOT OF Y. MOMENT OF INERTIA VS. TIME

SERIAL ABOVE

120

137

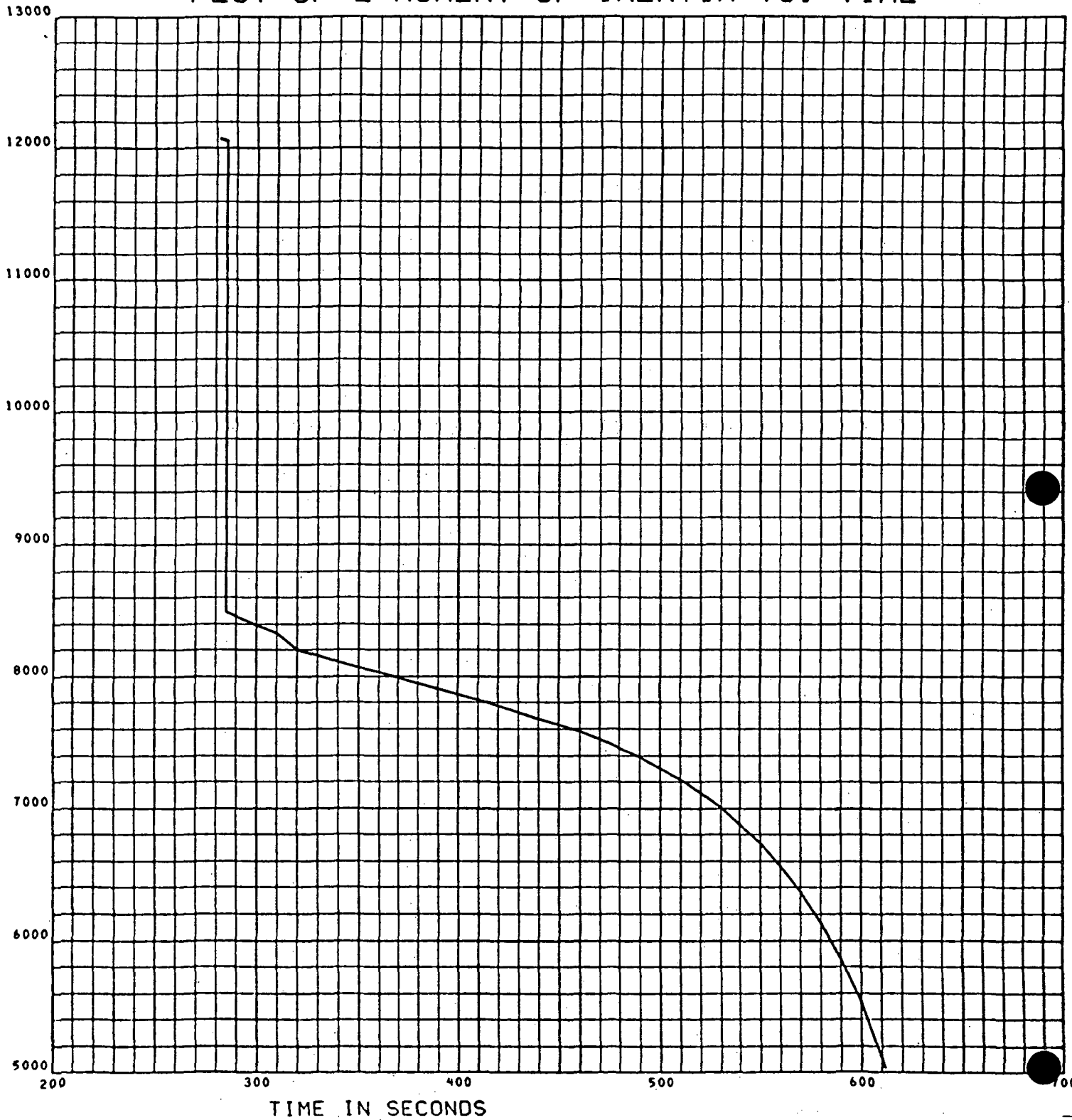


STAGE II AND PAYLOAD YAW MOMENT OF INERTIA
 PLOT OF Z MOMENT OF INERTIA VS. TIME

121

14

Z MOMENT OF INERTIA IN SLUG-FT²



Section 7

INSTRUMENTATION CHANNEL ASSIGNMENTS AND GROUND MONITORING ASSIGNMENTS

The instrumentation channel assignments for the AE-C mission are presented in Table 7-1.

The ground monitoring assignments for the AE-C mission are presented in Table 7-2.

Table 7-1

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

FM CHANNEL ASSIGNMENTS				
3.1 First Stage	CHANNEL NUMBER	FREQUENCY (KHz)	PARAMETER	RANGE
	8	3.0	Sequence #1	Event
			a. MECO	
			b. Fuel Tank Float Switch	
			c. LOX Tank Float Switch	
			d. VECO	
	10	5.4	Control Battery Current	0-140 Amps
	11	7.35	Main Engine Chamber Pressure	0-800 psia
	12	10.5	Turbopump Speed	0-8000 RPM
	C	40.0	PDM #2	
	E	70.0	PDM #1	
				PRIORITY
				1
				3
				2
				2
				2
				1

NOTE: Channels 7, 9, 13 and A are spare in the vehicle.

MCDONNELL DOUGLAS ASTRONAUTICS CO.
HUNTINGTON BEACH, CALIF.

MCDONNELL DOUGLAS

SIZE

A

CODE IDENT NO.

18355

DRAWING NO.

1B89858

SCALE

REV

SHEET

4

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

PDM #1 CHANNEL ASSIGNMENTS

3.1 First Stage

CHANNEL NUMBER	PARAMETER	RANGE	PRIORITY
1	*5 VDC Reference	0-5 VDC	1
2	Instrumentation Ground	0-5 VDC	2
3	ME Pitch Position	+ 5°	1
4	ME Yaw Position	+ 5°	1
5	VE #1 Pitch/Roll Position	+ 45°	1
6	VE #1 Yaw Position	-8 to -28°	1
7	VE #2 Pitch/Roll Position	+ 45°	1
8	VE #2 Yaw Position	+8 to +28°	1
9	Pitch Summing Amp Output	+ 4.5V	1
10	Yaw Summing Amp Output	+ 4.5V	1
11	Roll Summing Amp Output (VE No. 2)	+ 4.5V	1
12	Roll Summing Amp Output (VE No. 1)	+ 4.5V	1
13	Sequence #9	Event	2
	a. VE Lockout		
	b. Gain Change		
14	Solid Motor #4 Chamber Pressure	0-800 psia	2
15	Solid Motor #5 Chamber Pressure	0-800 psia	2
16	Solid Motor #6 Chamber Pressure	0-800 psia	2
17	Feedback Potentiometer Excitation (+)	0 to +30 VDC	3
18	Feedback Potentiometer Excitation (-)	-13 to -30 VDC	3
19	Solid Motor #7 Chamber Pressure	0-800 psia	2

* Parameters which are also ground monitored.

** Similar information is ground monitored.

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REV

SHEET

5

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

PDM #1 CHANNEL ASSIGNMENTS

3.1 First Stage

CHANNEL NUMBER	PARAMETER	RANGE	PRIORITY
20	Solid Motor #8 Chamber Pressure	0-800 psia	2
21	Actuator Excitation (-)	-13 to -30 VDC	3
22	VE #2 Chamber Pressure	0-500 psia	2
23	Control Battery Voltage	0-35 VDC	1
24	Instrumentation Battery Voltage	0-32 VDC	2
25	Hydraulic Supply Pressure	0-4000 psia	1
26	*Hydraulic Return Pressure	0-400 psia	1
27	Hydraulic Reservoir Piston Position	0-100%	2
28	**Sequence #2 - Solid Motor Sets #2 & #3		1
	a. Ignition Arm Relay K-1		
	b. Ignition Arm Relay K-2		
	c. Ignition Command Relay K-3		
	d. Ignition Command Relay K-4		
29	Solid Motor Potentiometer Excitation	0-5 VDC	2
30	Sequence #4	Event	2
	a. Range Safety VECO		
	b. Liftoff Indicate #1		
	c. Liftoff Indicate #2		
31	**Sequence #3 - Solid Motor Set #3	Event	1
	a. Separation Relay K-8		
	b. Separation Relay K-9		
	c. Separation Relay K-10		

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SCALE

REV

SHEET 6

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

CHANNEL NUMBER	PARAMETER	RANGE	PRIORITY
32	**Sequence #6 - Solid Motor Set #2 a. Separation Relay K-11 b. Separation Relay K-12 c. Separation Relay K-13 * Engine Pneumatic Bottle Pressure Actuator Excitation (+)	Event	1
33	**Sequence #7 - Solid Motor Set #1 a. Ignition Relay K-5	0-5000 psia	1
34	b. Ignition Relay K-6	+45 to +55 VDC	3
35	c. Ignition Relay K-7	Event	1
36	Sequence #5 a. DIGS VECO b. Separation Command c. MECO Enable d. DIGS Separation Command Solid Motor #1 Chamber Pressure Solid Motor #2 Chamber Pressure	Event	1
37	**Sequence #8 - Solid Motor Set #1 a. Separation Relay K-14	0-800 psia	2
38	b. Separation Relay K-15	0-800 psia	2
39	c. Separation Relay K-16 *Main Fuel Tank Top Pressure	Event	1
40		0-100 psia	2

3.1 First Stage

PDM #1 CHANNEL ASSIGNMENTS

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REV

SHEET

7

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

PDM #1 CHANNEL ASSIGNMENTS

CHANNEL NUMBER	PARAMETER	RANGE	PRIORITY
41	Solid Motor #3 Chamber Pressure	0-800 psia	2
42	*LOX Tank Top Pressure	0-100 psia	2
43	Solid Motor #9 Chamber Pressure	0-800 psia	2
44	Framing Signal		
45	Framing Signal		

3.1 First Stage

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REV

SHEET 8

3.1 First Stage

PDM #2 CHANNEL ASSIGNMENTS

CHANNEL NUMBER	PARAMETER	RANGE	PRIORITY
1	5 VDC Reference	0-5 VDC	2
2	*Instrumentation Ground	0-5 VDC	2
3	Fuel Pump Inlet Pressure	0-200 psia	2
4	Open		
5	Open		
6	Open		
7	Main Engine Chamber Pressure	0-800 psia	3
8	Turbine Inlet Temperature	-30 to +1500°F	2
9	LOX Pump Inlet Pressure	0-100 psia	2
10	GG LOX Injector Pressure	0-800 psia	2
11	LOX Pump Inlet Temperature	-275° to -300°F	2
12	12.35 V Bias	0-12.35 VDC	2
13	VE #1 Housing Temperature	32-1000°F	3
14	VE #2 Housing Temperature	32-1000°F	3
15	ME Pitch Actuator Temperature	32-1000°F	3
16	Air Conditioning Inlet Temperature	32-1000°F	3
17	Skirt Section Temperature	32-1000°F	3
18	Open		
19	Open		
20	Open		
21	Open		
22	Open		
23	Main Engine Pitch Servo Differential Signal + 8 ma		3

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REV

SHEET

9

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.1 First Stage

PDM #2 CHANNEL ASSIGNMENTS

CHANNEL NUMBER	PARAMETERS	RANGE	PRIORITY
24	VE #1 Pitch/Roll Servo Differential Signal	+ 8 ma	3
25	VE #2 Pitch/Roll Servo Differential Signal	+ 8 ma	3
26	Main Engine Yaw Servo Differential Signal	+ 8 ma	3
27	VE #1 Yaw Servo Differential Signal	+ 8 ma	3
28	VE #2 Yaw Servo Differential Signal	+ 8 ma	3
29	+10 VDC Transducer Power	0 to 20 VDC	3
30	-10 VDC Transducer Power	0 to -20 VDC	3
31	Hydraulic Oil Temp.	-20°F to +300°F	3
32	Hydraulic Accum GN ₂ Pressure	0-4000 psia	3
33	*Helium Bottle Pressure	0-2000 psia	2
34	Open		
35	Open		
36	Open		
37	Thrust Chamber Dome Oxidizer Pressure	0-1000 psia	3
38	Fuel Pump Outlet Pressure	0-1000 psia	3
39	Gas Generator Fuel Inlet Pressure	0-800 psia	3
40	Thrust Chamber Dome Fuel Injector Pressure	0-1000 psia	3
41	Compliance Device Temp. No. 1	-300° to +60°F	2
42	Compliance Device Temp. No. 2	-300° to +60°F	2
43	Compliance Device Temp. No. 3	-300° to +60°F	2
44	Framing Signal		
45	Framing Signal		

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SCALE

REV

SHEET

10

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.2 Second Stage

FM CHANNEL ASSIGNMENT

FM CHANNEL NO. & FREQUENCY	PARAMETER	TYPE	RANGE	PRIORITY
1. (.4 KHz)	Gyro Wheel Supply	Analog	338 + 10 Hz	2
6. (1.7 KHz)	Yaw Jet Actuation	Event	----	2
	(a) Spin Rate			
	(b) Yaw Right			
	(c) Yaw Left			
7. (2.3 KHz)	Pitch Jet Actuation	Event	----	2
	(a) Pitch Up			
	(b) Pitch Down			
	(c) Engine Start Bus			
8. (3.0 KHz)	Roll Jet Actuation	Event	----	1
	*(a) Roll CW			
	*(b) Roll CCW			
	(c) Time Base Reference			
9. (3.9 KHz)	Thrust Chamber Press	Analog	0-200 PSIA	2
10. (5.4 KHz)	2nd Stage Yaw Control Sig	Analog	+ 10V***	2
11. (7.35 KHz)	2nd Stage Pitch Control Sig	Analog	+ 10V***	2
12. (10.5 KHz)	Triaxial Accelerometer Yaw Axis (Z)	Analog	+ 2G	3
13. (14.5 KHz)	Triaxial Accelerometer Pitch Axis (Y)	Analog	+ 2G	3
A. (22 KHz)	Triaxial Accelerometer Thrust Axis (X)	Analog	+ 5G	3
C. (40 KHz)	Flow Rates	Analog		2
	(a) Fuel		6-13 lb/sec	
	(b) Open			
	(c) Oxidizer		17-26 lb/sec	
E. (70 KHz)	PDM		----	1
G. (124 KHz)	PCM		----	1

* Parameters which are also ground monitored

*** Uninverted side only (Not differential)

** Similar information is ground monitored

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SCALE

REV

SHEET

11

3.2 Second Stage

PDM/FM CHANNEL ASSIGNMENT - SECOND STAGE

Table 7-1 (Continued)				
INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION				
PDM CHANNEL NO.	PARAMETER	TYPE	RANGE	PRIORITY
1.	5V Absolute	Analog	0-5V	3
2.	*Instr. Ground	Analog	0-5V	2
3.	Yaw Summing Amp Output	Analog	+ 4.5V	1
4.	Valve Excitation (POS)	Analog	35 ± 5V	3
5.	Event Group No. 1	Event	----	2
	(a) Hyd Pump On			
	(b) Oxidizer Level Sensor			
	(c) Sec. P/L Command #3			
6.	Valve Excitation (NEG)	Analog	-35 ± 5V	3
7.	*GC Logic Voltage	Analog	0-5V	2
8.	Roll Jet Signal	Event	----	2
	(a) Roll CW			
	(b) Roll CCW			
	(c) Sec. P/L Command #1			
9.	Pitch Actuator Position	Analog	+ 3 deg	1
10.	Pitch Jet Signal	Event	----	2
	(a) Pitch Up			
	(b) Pitch Down			
	(c) Wire Cutter Command			
11.	*IMU Block Temperature	Analog	+155° to +165°F	3
12.	Event Group No. 6	Event	----	2
	*(a) Arm #2 and Arm #1			
	** (b) 1st-2nd Stage Separation Command			
	(c) Gain Change			
13.	Yaw Actuator Position	Analog	+ 3 deg	1
14.	Event Group No. 4	Event	----	2
	(a) Pairing Separation (Actual J1108)			
	*(b) Payload Separation Command and Retro Command			
	*(c) CDR No. 2 Arm			

▲ - Segment Not Used

▲ Segment Not Used - TM

Signal Present

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DRAWING NO.

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SCALE

REV.

SHEET

12

3.2 Second Stage

PDM/FM CHANNEL ASSIGNMENT - SECOND STAGE

PDM
CHANNEL NO.

PARAMETER	TYPE	RANGE	PRIORITY
Event Group No. 5	Event	----	2
(a) TPS Unpressurized			
*(b) CDR No. 1 Arm			
*** (c) Third Stage Spin Up Command			
*Nitrogen Bottle Pressure	Analog	0-5000 PSIG	1
*5V Potentiometer Excitation	Analog	0-5V	2
Pitch Summing Amp Output	Analog	+ 4.5V	1
Pitch Servo Differential Signal	Analog	+ 8 ma	3
*Control Battery Voltage	Analog	25-33V	1
*Instrumentation Battery Voltage	Analog	25-33V	2
*Oxidizer Tank Pressure	Analog	0-500 PSIA	2
*Hydraulic System Press.	Analog	0-2000 PSIG	1
Feedback Potentiometer Excitation (Positive)	Analog	20 + 6V	3
Feedback Potentiometer Excitation (Negative)	Analog	-20 + 6V	3
Event Group No. 3	Event	----	2
(a) Fuel Level Sensor			
*(b) Tank Pressurization Command			
(c) Pairing Separation (Actual J1109)			
*Nitrogen Regulated Press.	Analog	0-500 PSIA	1
Oxidizer Line Temperature	Analog	0-100°F	1
Thrust Chamber Valve Position	Analog	0-100%	2
Yaw Jet Signal	Event	----	2
(a) Yaw Right			
(b) Yaw Left			
*** (c) Sec. P/L Command #2			

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

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18355

DRAWING NO.

1889858

SCALE

REV

SHEET

13

3.2 Second Stage

PDM/FM CHANNEL ASSIGNMENT - SECOND STAGE

PDM CHANNEL NO.	PARAMETER	TYPE	RANGE	PRIORITY	INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION	
31.	GC Memory Voltage	Analog	0-13V	2		2
32.	IMU Gyro Excitation	Analog	0-27.5 VRMS	2		2
33.	1st Stage Roll Control Signal	Analog	+ 10V***	2		2
34.	Event Group No. 2	Event	----	2		2
	*(a) Arm Bus					
	** (b) Fairing Separation Command					
	*** (c) Ullage Jet Command					
35.	*IMU Logic Voltage	Analog	0-5V	2		2
36.	Yaw Servo Differential Signal	Analog	+ 8 ma	3		3
37.	*Helium Bottle Pressure	Analog	0-5000 PSIG	1		1
38.	Helium Regulated Pressure	Analog	0-700 PSIA	1		1
39.	Fuel Line Temperature	Analog	0-100°F	2		2
40.	Fuel Injector Pressure	Analog	0-300 PSIA	2		2
41.	Oxidizer Injector Pressure	Analog	0-300 PSIA	2		2
42.	*Fuel Tank Pressure	Analog	0-500 PSIA	2		2
43.	*Engine Battery Voltage	Analog	25-33V	1		1
44.	Framing Signal					
45.	Framing Signal					

*** Inverted side only (Not differential)

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SCALE

REV

SHEET

14

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.3 PCM Telemetry Parameters (Second Stage FM Channel G)

<u>Word No.</u>	<u>Symbol</u>	<u>Parameter</u>
1	$\epsilon(\phi)$	Roll angular change over msec period
2	$\Delta(\phi)$	Roll attitude error
3	$\epsilon(\theta)$	Pitch angular change over msec period
4	$\Delta(\theta)$	Pitch attitude error
5	$\epsilon(\psi)$	Yaw angular change over 20 msec period
6	$\Delta(\psi)$	Yaw attitude error
7	$\xi^{\circ}(1)$	Roll DAC or on/off output
8	$\xi^{\circ}(2)$	Pitch DAC or on/off output
9	$\xi^{\circ}(3)$	Yaw DAC or on/off output
10	t	Clock time
11	$\xi^B(1)$	Shaped roll rate
12	$\xi^S(3)$	Shaped pitch rate
13	$\xi^B(5)$	Shaped yaw rate
14	$\xi^B(2)$	Shaped roll attitude
15	$\xi^S(4)$	Shaped pitch attitude
16	$\xi^S(6)$	Shaped yaw attitude
17	$\dot{\theta}^P(\phi)$	Programmed roll rate
18	$\dot{\theta}^P(\theta)$	Programmed pitch rate
19	$\dot{\theta}^P(\psi)$	Programmed yaw rate
20	D1	Vehicle output discrete word #1
21	D2	Vehicle output discrete word #2
22	$1/M_2$	Orthonormalization parameter
23	-	Computer self check status word
24	t	Clock time
25	$\epsilon V^B(X)$	Increment of velocity gained in body coordinates over 20 msec period
26	$\epsilon V^B(Y)$	
27	$\epsilon V^B(Z)$	

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.3 PCM Telemetry Parameters (Second Stage FM Channel G) (Cont'd)

<u>Word No.</u>	<u>Symbol</u>	<u>Parameter</u>
28	T_{11}	Most significant word of the attitude transformation matrix from body to inertial coordinates
29	T_{21}	
30	T_{31}	
31	T_{12}	
32	T_{22}	
33	T_{32}	
34	T_{13}	
35	T_{23}	
36	T_{33}	
37	t^{cf}	Adjusted clock time used to sequence all vehicle operation.
38	T^{GUID}	FLAG indicating current area of guidance computations.
39	a^T	Acceleration along vehicle thrust axis
40	mode	
41	$V^N(X)$	Present velocity in computational coordinates
42	$V^N(Y)$	
43	$V^N(Z)$	
44	$P^N(X)$	Present position in computational coordinates
45	$P^N(Y)$	
46	$P^N(Z)$	
47	$\Delta V^N(X)$	Total velocity change over guidance interval
48	$\Delta V^N(Y)$	
49	$\Delta V^N(Z)$	

Table 7-1 (Continued)

INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.3 PCM Telemetry Parameters (Second Stage FM Channel G) (Cont'd)

<u>Word No.</u>	<u>Symbol</u>	<u>Parameter</u>
50	-	Subframe sync word - fixed value = 05341116 (octal)
51	-	ID word - fixed value = 67432222 (octal)
52	T^M_{GUID}	FLAG indicating current area of guidance computations
53	t^R	Time-to-go to end of stage
54	ΔT^{orb}	Time adjustment along orbit
55	$P^B(1)$	Position to be gained over rest of stage excluding present curve-fit segment
56	$P^B(2)$	
57	$P^B(3)$	
58	$\Delta P(1)$	Difference between predicted and nominal position at end of stage
59	$\Delta P(2)$	
60	$\Delta P(3)$	
61	$A(1)$	Present predicted acceleration of vehicle from curve fit data
62	$A(2)$	
63	$A(3)$	
64	-	Subframe sync word-fixed value = 05341116 (octal)
65	-	ID word - fixed value = 67433333 (octal)
66	T^M_{GUID}	FLAG indicating current area of guidance computations
67	$\dot{\theta}^R$	Closed-loop guidance steering pitch rate
68	$\dot{\psi}^R$	Closed-loop guidance steering yaw rate
69	$eP^M(X) [B(X)]$	Predicted position error in body coordinates [Prelaunch - gyro bias corrections]

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SCALE

REV

SHEET

17

Table 7-1 (Continued)
INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.3 PCM Telemetry Parameters (Second Stage FM Channel G) (Cont'd)

<u>Word No.</u>	<u>Symbol</u>	<u>Parameter</u>
70	$\epsilon P^M(Y) [B(Y)]$	Predicted position error in body coordinates [Prelaunch - gyro bias corrections]
71	$\epsilon P^M(Z) [B(Z)]$	
72	$\epsilon V^M(X) [\epsilon^B(X)]$	Predicted velocity error in body coordinates [Prelaunch - alignment error correction]
73	$\epsilon V^M(Y) [\epsilon^B(Y)]$	
74	$\epsilon V^M(Z) [\epsilon^B(Z)]$	
75	$\Delta a^M(X)$	Present acceleration error in body coordinates
76	$\Delta a^M(Y)$	
77	$\Delta a^M(Z)$	
78	-	Subframe sync word - fixed value = 05341116 (octal)
79	-	ID word - fixed value = 67434444 (octal)
80	T^M_{GUID}	FLAG indicating current area of guidance computations
81	THX	Storage location for single shot parameters
82	C1	Roll rate time varying gain
83	C2	Roll attitude time varying gain
84	C3	Pitch rate time varying gain
85	C4	Pitch attitude time varying gain
86	Δt^S	Correction in time-to-go
87	KGUID	Closed-loop targeting constants table pointer
88	KFILT(1)	Roll-rate filter table pointer
89	KFILT(3)	Pitch-rate filter table pointer

Table 7-1 (Continued)
INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

3.3 PCM Telemetry Parameters (Second Stage FM Channel G) (Cont'd)

<u>Word No.</u>	<u>Symbol</u>	<u>Parameter</u>
90	KFILT(5)	Yaw-rate filter table pointer
91	P steer	Type of steering indicator
92	-	Subframe sync word - fixed value = 05341116 (octal)
93	-	ID word - fixed value = 67431111 (octal)

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SCALE

REV

SHEET

19

Table 7-1 (Continued)
INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

4.0 TABLE OF DEFINITIONS

CDR	Command Destruct Receiver
CCW	Counter-Clockwise
CW	Clockwise
FM	Frequency Modulation
GC	Guidance Computer
GG	Gas Generator
Hz	Hertz
IMU	Inertial Measurement Unit
KHz	Kilohertz
LOX	Liquid Oxygen
ME	Main Engine
MECO	Main Engine Cutoff
MRD	Measurement Request Drawing
OX	Oxidizer
PCM	Pulse Code Modulation
PDM	Pulse Duration Modulation
P/L	Payload
SECO	Second Stage Engine Cutoff
TPS	Thrust Pressure Switch
VE	Vernier Engine
VECO	Vernier Engine Cutoff

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REV

SHEET 20

Table 7-1 (Concluded)
INSTRUMENTATION CHANNEL ASSIGNMENTS - AE-C MISSION

5.0 GENERAL NOTES

5.1 Instrumentation Launch Priority Definitions

Priority 1: Channels classified priority one shall be properly functioning at liftoff. Launch permission shall not be granted until malfunctions of priority one channels are isolated and corrected.

A priority one channel is so classified because:

1. The channel is mandatory to determine vehicle launch status.
2. The channel is mandatory to monitor hazardous systems (Hydraulics, Pneumatics, Ordnance).
3. The channel is mandatory to evaluate malfunctions in vehicle primary systems.

Priority 2: Channels classified priority two may be nonoperational for flight if:

1. The malfunction is isolated.
2. The malfunction will conclusively have no impact on vehicle performance.

Priority two channel is so classified because:

1. The parameter, although necessary to verify launch status, is also monitored on AGE.
2. The channel is 'backed up' by other instrumentation where potentially destructive systems are being monitored.
3. The channel is required to reconstruct vehicle flight trajectory and propulsion performance i.e., Hydraulics, Pneumatics, auto pilot control, engine.
4. The channel is part of an R&D instrumentation mod, is implemented for limited effectivity, and its loss will impact future analysis for which the R&D instrumentation was required.

Priority 3: Channels classified priority three need not be operational for flight. Launch permission shall not be granted until the fault is isolated. Repair of the malfunction shall proceed only if launch schedules are not impacted. Launch preparations shall proceed upon verification that vehicle functions or higher priority channels are not impaired by a priority three channel malfunction.

Priority three channels are so classified because:

1. They are not priority one or two.
2. They are not required to establish vehicle launch status.
3. They are not necessary to evaluate vehicle mission performance.
4. They are desirable for failure evaluation.

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DRAWING NO.

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SCALE

REV

SHEET

21

Table 7-2

GROUND MONITORING ASSIGNMENTS - AE-C MISSION

Following are the parameters to be ground monitored. These are measurements of the key missile functions to be monitored in the blockhouse prior to missile liftoff. The assignments include key Aerospace Ground Equipment (AGE) parameters to be monitored in the blockhouse prior to missile liftoff.

First Stage

<u>ITEM</u>	<u>PARAMETER</u>	<u>RANGE</u>
1	Main Fuel Tank Top Pressure	0-- 50 psig
2	Main Liquid Oxygen Tank Top Pressure	0 - 50 psig
3	Fuel Start Tank Pressure	0 - 800 psig
4	Liquid Oxygen Start Tank Pressure	0 - 800 psig
5	Engine & Control High Pressure Bottles	0 - 5,000 psig
6	Engine Regulator Discharge Pressure	0 - 800 psig
7	5 Volt Reference	0 - 5 volts
8	Command Destruct Receiver Arm Signal	Light
9	Missile Battery	26 - 30 volts
10	Main Liquid Oxygen Tank Levels (95, 99 and 100 percent)	Light
11	Solid Motor Set #1 Interface Connector (Motors 1, 2, 3)	0 - 28 volts
12	Solid Motor Set #2 Interface Connector (Motors 4, 5, 6)	0 - 28 volts
13	Solid Motor Set #3 Interface Connector (Motors 7, 8, 9)	0 - 28 volts
14	F.I.P. Switch Monitor S300	Light
15	F.I.P. Switch Monitor S301	Light
16	Separation Arm Bus Monitor	Light Off
17	Separation Arm Bus Monitor	Light Off
18	Ignition Arm Bus Monitor	Light Off
19	Ignition Arm Bus Monitor	Light Off
20	FABU Current	0 - 3 amps
21	Engine Heaters Current	0 - 20 amps
22	Lube Line Low Point Temperature	0 - 150°F
23	Engine Section Temperature	0 - 150°F
24	Helium Bottle Pressure	0 - 2,000 psig
25	Command Destruct Receiver AGC	Strip Chart
26	Command Destruct Receiver Channel 5 Monitor	Light

Table 7-2 (Continued)

GROUND MONITORING ASSIGNMENTS - AE-C MISSION

Second Stage

<u>ITEM</u>	<u>PARAMETER</u>	<u>RANGE</u>
1	Oxidizer Tank Pressure	0 - 500 psia
2	Helium Bottle Pressure	Strip Chart
3	Nitrogen Regulated Pressure	Strip Chart
4	Fuel Tank Gas Pressure	0 - 500 psia
5	Helium Regulated Pressure	Strip Chart
6	Nitrogen Bottle Pressure	Strip Chart
7	Control Battery Voltage	20 - 40 volts DC
8	Instrumentation Battery Voltage	20 - 40 volts DC
9	5V Divided Internal Bus	5 volts
10	Compartment	30 - 120°F
11	Fairing Inlet Temperature	30 - 120°F
12	Fairing Outlet Temperature	30 - 120°F
13	Hydraulic Pressure	0 - 2,000 psig
14	Command Destruct Receiver No. 2 AGC	0 - 5 volts DC
15	Command Destruct Receiver No. 2 Arm Signal	Light
16	Command Destruct Receiver No. 2 Channel 5 Monitor	Light
17	Command Destruct Receiver No. 1 AGC	0 - 5 volts DC
18	Command Destruct Receiver No. 1 Arm Signal	Light
19	Command Destruct Receiver No. 1 Channel 5 Monitor	Light
20	Engine Battery Voltage	20 - 40 volts DC
21	Nitrogen Bottle Skin Temperature	Strip Chart
22	Helium Bottle Skin Temperature	Strip Chart
23	Arm Relay #1 and #2 Monitor	Light
24	Relay Status Monitor	Light
25	Thrust and Ullage Off Monitor	Light
26	Liftoff Monitor	Light
27	Arm Bus Monitor	Light
28	Arm #1 and #2 Discrete Monitor	Light

Table 7-2 (Continued)

GROUND MONITORING ASSIGNMENTS - AE-C MISSION

Second Stage (Concluded)

<u>ITEM</u>	<u>PARAMETER</u>	<u>RANGE</u>
29	IMU Logic Voltage	Light
30	IMU Gyro Excitation	Light
31	IMU Block Temperature	Light
32	IMU GX SMRD	Light
33	IMU GY SMRD	Light
34	IMU GZ SMRD	Light
35	IMU Wax Temperature	Light
36	GC Temperature	Light
37	GC Logic Voltage	Light
38	GC Memory Voltage	Light

AGE Ground Monitoring

<u>ITEM</u>	<u>PARAMETER</u>	<u>RANGE</u>
1	Pneumatic Console Supply Pressure	0 - 6,000 psia
2	3,000 psi Bank Pressure	0 - 3,500 psig
3	750 psi Bank Pressure	0 - 800 psia
4	33 psi Bank Pressure (Main LOX Pre-Press.)	0 - 50 psia
5	25 psi Bank Pressure (Main Fuel Pre-Press.)	0 - 50 psia
6	2,600 psi Bank Pressure	0 - 3,500 psia
7	LOX Topping Tank Pressure	0 - 150 psia
8	LOX Complex GN ₂ Supply Pressure	0 - 2,500 psig
9	First Stage Regulator Outlet Pressure	0 - 1,000 psig
10	Second Stage Regulator Outlet Pressure	0 - 200 psig
11	Storage Tank Pressure - Liquid Oxygen	0 - 150 psig
12	Helium Fill Pressure	Strip Chart
13	Nitrogen Fill Pressure	Strip Chart

Table 7-2 (Concluded)

GROUND MONITORING ASSIGNMENTS - AE-C MISSION

AGE Ground Monitoring (Concluded)

<u>ITEM</u>	<u>PARAMETER</u>	<u>RANGE</u>
14	Helium Gas Fill Temperature	-150°F to 150°F
15	Nitrogen Gas Fill Temperature	-50°F to 150°F
16	Helium Preload Pressure	Strip Chart
17	Nitrogen Preload Pressure	Strip Chart
18	Nitrogen Storage Tank Pressure	0 - 50 psig

Section 8

REFERENCES

1. McDonnell Douglas Memorandum A3-250-ADEO-72149: "Nominal DSV-3P-1 Booster Propulsion System Flight Simulation with Nine TX354-5 Solid Motors (VTC)," dated 15 May 1972 (a nondeliverable document on file at MDAC-W).
2. McDonnell Douglas Memorandum A3-250-ADEO-71124: "Nominal Second Stage Model DSV-3N-4 Propulsion Flight Simulation (Non-Restart, $\epsilon = 26.3:1$)," dated 26 March 1971 (a nondeliverable document on file at MDAC-W).
3. McDonnell Douglas Memorandum A3-250-AAC3-M-72-169: "Revised Velocity Degradation Value for the MB-3 Model III Nominal Propulsion Simulations," dated 13 April 1971 (a nondeliverable document on file at MDAC-W).
4. Design Review Agreement A3-AAA3-262: "Total Vehicle Aerodynamic Characteristics, Stretched Tank Isogrid Delta with 65" Fairing," dated 10 March 1971 (a nondeliverable document on file at MDAC-W).
5. McDonnell Douglas Memorandum A3-250-AAA3-M-73-085: "High Angle of Attack Aerodynamic Characteristics for the AE-C Mission," dated 12 March 1973 (a nondeliverable document on file at MDAC-W).
6. McDonnell Douglas Memorandum A3-250-AAC3-M-73-101: "Transtage Propellant Utilization Study - Contract NAS7-811L," dated 2 March 1972 (transmitted to NASA by MDC Letter A3-130-Delta/AKM3-720376, dated 7 March 1972).

LIST OF SYMBOLS

COMPUTER PROGRAM
AB60

MAIN PRINTOUT

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
A SB XB	a_{xB}	35	Components of acceleration along the vehicle axes: positive forward along vehicle centerline; normal to the vehicle pitch plane, to the right; and down, respectively, ft/sec ² .
A SB YB	a_{yB}	36	
A SB ZB	a_{zB}	37	
A STAR	A*	28	Radar azimuth angle: angle between the radar site meridian and the projection of the radar line of sight onto the plane tangent to the surface of the earth at the radar site, positive clockwise from north, deg.
ALPHA	α	83	Pitch angle of attack: angle between the projection of the relative air velocity vector onto the vehicle pitch plane and the centerline of the vehicle, positive nose up, deg.
ALPHA*	α'	85	Total angle of attack: angle between the relative air velocity vector and the vehicle centerline, deg.
ALPHA*Q	$q \alpha'$	93	Product of total angle of attack and dynamic pressure, deg-lb/ft ² .
ALTITUDE	h	15	Vehicle altitude: distance above mean sea level measured along the normal to the earth's surface (oblate spheroid) positive up, ft or n mi.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
BETA	β	84	Yaw angle of attack: angle between the projection of the relative air velocity vector onto the vehicle yaw plane and the centerline of the vehicle, positive nose left, deg.
BETA SB L*	β'_L	45	Difference between vehicle centerline azimuth angle, ψ'_L , and the inertial flight path azimuth angle, γ'_{2I} , positive for $\gamma'_{2I} > \psi'_L$, deg.
CHORD FORCE	C	22	Aerodynamic force directed along the vehicle centerline opposing vehicle motion, lb.
D STAR	D*	27(ft) 104(nmi)	Radar slant range: straight line distance from radar site to vehicle, ft or n. mi.
D-D STAR X	\dot{D}^*	88	Component of vehicle earth-fixed velocity, along the radar line of sight, ft/sec.
DELTA SB Y	Δ_y	43	Motor yaw deflection angle: angle between the thrust vector and the vehicle pitch plane, positive nose left, deg.
DELTA SB Z	Δ_z	44	Motor pitch deflection angle: angle between the projection of the thrust vector onto the vehicle pitch plane and the vehicle centerline, positive nose up, deg.
E STAR	E*	29	Radar elevation angle: angle between the radar line of sight and the plane tangent to the earth's surface at the radar site, positive for vehicle above radar tangent plane, deg.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
ETA SB 1	η_1	14	Instantaneous azimuth angle: angle between the launch site meridian and the plane perpendicular to the surface of the earth at the launch site containing the vehicle, positive clockwise from north, deg.
F SB X	F_x	38	Thrust components in vehicle coordinates: F_x positive forward, positive F_y yaws nose to the left, positive F_z pitches nose up, lb.
F SB Y	F_y	39	
F SB Z	F_z	40	
G SB L*	g'_L	61	Total resultant gravity vector due to attractive force of the earth measured in the x'_L, y'_L, z'_L coordinate system, ft/sec ² .
G SB XL*	g'_{xL}	62	Components of gravity due to attractive force of the earth measured in a coordinate system where x'_L is positive north, y'_L is positive east, and z'_L is positive toward the center of the earth along a line connecting the vehicle and the earth's center, ft/sec ² .
G SB ZL*	g'_{zL}	63	
GAMMA (Z) or GAMMA SB Z	γ_z	89	Flight path elevation angle, non-inertial: angle between the rotating earth velocity vector, \bar{V}_e , and the launch tangent (x-y) plane, positive for vehicle moving in the direction of the minus z axis, deg.
GAMMA SB 1	γ_1	10	Flight path elevation angle, non-inertial: angle between the rotating earth velocity vector, \bar{V}_e , and the local tangent plane, positive for vehicle moving away from the earth, deg.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>DEFINITION</u>
GAMMA SB 1I	γ_{1I}	Flight path elevation angle, inertial: angle between the total inertial velocity vector, \bar{V}_I , and the local tangent plane, positive for vehicle moving away from the earth, deg.
GAMMA SB 1I*	γ'_{1I}	Flight path elevation angle, inertial: angle between the total inertial velocity vector, \bar{V}_I , and a plane perpendicular to the radius vector from the center of the earth to the vehicle positive for vehicle moving away from the earth, deg.
GAMMA SB 2	γ_2	Flight path azimuth angle, non-inertial: angle between the local (instantaneous) meridian and the projection of the rotating earth relative velocity vector, \bar{V}_e , onto the local tangent plane, positive clockwise from true north, deg.
GAMMA SB 2I	γ_{2I}	Flight path azimuth angle, inertial: angle between the local meridian and the projection of the total velocity vector, \bar{V}_I , onto the local tangent plane, positive clockwise from true north, deg.
GAMMA SB 2I*	γ'_{2I}	Flight path azimuth angle, inertial: angle between the local meridian and the projection of the total velocity vector, \bar{V}_I , onto a plane perpendicular to the radius vector from the center of earth to the vehicle, positive clockwise from true north, deg.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
INCLINATION (also in glide phase)	i	86	Orbit inclination angle: angle between the satellite orbit plane and the earth's equatorial plane measured counter-clockwise from due east at the ascending node, ranging from zero degrees for a west-to-east orbit to 180 degrees for an east-to-west orbit, deg.
M SB Y	M_y	46	Total aerodynamic moments about the normal to the vehicle pitch and yaw planes, respectively; M_y positive for pitch-up moment and M_z positive for nose left moment, ft-lb.
M SB Z	M_z	47	
MACH	M	19	Mach number.
MU	μ	48	Instantaneous vehicle longitude measured positive west and negative east from Greenwich, England, deg.
N SB Y/W	N_y/W	21	Nondimensional aerodynamic forces normal to vehicle pitch and yaw planes, respectively; N_y positive left and N_z positive up.
N SB Z/W	N_z/W	20	
P SB M	P_m	49	Attitude control program rates, angular velocities about vehicle axes X_m , Y_m , Z_m , respectively, deg/sec.
Q SB M	Q_m	50	
R SB M	R_m	51	
PHI SB I	ϕ_i	54	See "THETA SB I"
D-PHI SB I	$\dot{\phi}_i$	57	See "D-THETA SB I"
PHI SB L*	ϕ_L'	95	Vehicle instantaneous geocentric roll angle, deg.
PHI SB M	ϕ_m	6	See "THETA SB M"
D-PHI SB M	$\dot{\phi}_m$	9	See "D-THETA SB M"
PRESSURE	P_a	23	Atmospheric pressure, lb/ft ²
PSI SB I	ψ_i	52	See "THETA SB I"

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
D-PSI SB I	ψ_1	55	See "D-THETA SB I"
PSI SB L*	ψ_L	70	Vehicle centerline azimuth angle: angle between the local meridian and the projection of the vehicle center- line onto a plane perpendicular to the radius vector from the center of the earth to the vehicle, positive clockwise from true north, deg.
PSI SB M	ψ_m	5	See "THETA SB M"
D-PSI SB M	$\dot{\psi}_m$	8	See "D-THETA SB M"
Q PRESSURE	q	24	Dynamic pressure, lb/ft ² .
Q SB M	Q_m	50	See "P SB M"
R SB C	r_c	59	Instantaneous distance from the center of the earth to the vehicle, ft.
R SB L	r_L	60	Instantaneous earth radius, measured from the center of the earth to the point where the perpendicular from the vehicle to the earth's surface intersects the earth's surface, ft.
R SB M	R_m	51	See "P SB M"
RANGE	S	2	Surface range: instantaneous vehicle range along the earth's surface, based on the subtended arc and the mean earth radius from launch to present position, ft or n.mi.
RHO	ρ	25	Instantaneous vehicle geographic latitude: angle measured in the meridian plane between the equatorial plane and the line from the vehicle perpendicular to the earth's surface, positive north of the equator, deg.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
RHO*	ρ'	26	Instantaneous vehicle geocentric latitude: angle between the equatorial plane and the radius vector from the center of the earth to the vehicle, positive north of the equator, deg.
TAU SB P	τ_p	32	Radar polarization look angle: angle between the projection of the vehicle centerline on a plane perpendicular to the radar line of sight and the line of intersection of the plane containing the radar line of sight, perpendicular to the earth's surface at the radar site, positive counterclockwise from the apparent vertical (line of intersection) as viewed looking along the radar line of sight, deg.
TAU SB R	τ_R	31	Roll radar look angle: angle between the vehicle yaw plane and the projection of the radar line of sight onto the vehicle roll plane, measured clockwise from the pitch (positive Y_m) axis as viewed from the rear of the vehicle, deg.
TAU SB PHI	τ_ϕ		$90^\circ + \tau_R$
TAU SB T	τ_T	30	Total radar look angle: angle between the vehicle centerline and the radar line of sight, measured from the rear of the vehicle, deg.
TAU SB THETA	τ_θ		$180^\circ - \tau_T$
TEMPERATURE	T	12	Atmospheric temperature, degrees Rankine.
THETA SB I	θ_i	53	Euler angles specifying the orientation of the vehicle guidance inertial platform (i system) with respect to the inertial (eo) coordinate system which is
PSI SB I	ψ_i	52	
PHI SB I	ϕ_i	54	

<u>PRINTOUT</u> <u>SYMBOL</u>	<u>COMMON</u> <u>SYMBOL</u>	<u>PRINT</u> <u>CODE</u>	<u>DEFINITION</u>
THETA SB I (cont'd)			coincident with the rotating, earth-fixed (e) coordinate system at the time of launch. Order of rotation: ψ_1 about Z (positive turning X_{eo} into Y_{eo}), θ_1 about Y_{eo} (positive turning Z_{eo} into X_{eo}), ϕ_1 about X_1 (positive turning Y_{eo} into Z_{eo}), deg.
PSI SB I			
PHI SB I			
D-THETA SB I	$\dot{\theta}_1, \dot{\psi}_1$	56,55	Rate change of Euler angles θ_1, ψ_1 , and ϕ_1 , deg/sec.
D-PSI SB I			
D-PHI SB I	$\dot{\phi}_1$	57	
THETA SB L*	θ'_L	69	Vehicle centerline elevation angle: angle between the vehicle centerline and a plane perpendicular to the radius vector from the center of the earth to the vehicle, positive for vehicle nose pointing away from the earth, deg.
THETA SB M	θ_m	4	Euler angles specifying the orientation of the vehicle axes (X_m, Y_m, Z_m) with respect to the inertial reference platform (i system). Order of rotation: pitch, θ_m about Y_m (positive turning Z_m into X_m); yaw, ψ_m about Z_m (positive turning X_m into Y_m); and roll, ϕ_m about X_m (positive turning Y_m into Z_m), deg.
PSI SB M			
PHI SB M	ψ_m	5	
	ϕ_m	6	
D-THETA SB M	$\dot{\theta}_m, \dot{\psi}_m$	7,8	Rate of change of Euler angles θ_m, ψ_m , and ϕ_m , deg/sec.
D-PSI SB M			
D-PHI SB M	$\dot{\phi}_m$	9	
THRUST	F	3	Total vehicle thrust, lb.
TIME	t	1	Instantaneous time, measured from lift-off, sec.
TOT IMP VEL	V_{IMP}	96	Total impulsive velocity gain, ft/sec.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
U	U	96	Earth parameter measured in the equatorial plane, distance from the center of the earth to a perpendicular to the equatorial plane passing through the intersection of the normal from the vehicle with the earth's surface, ft.
V SB E	V_e	17	Vehicle velocity measured relative to the launch point on a rotating earth (i.e., the origin of the X_{ee} , Y_{ee} , Z_{ee} or x , y , z coordinate systems), ft/sec.
D-V SB E	\dot{V}_e	18	Vehicle acceleration along the flight path, measured with respect to the launch point, ft/sec ² .
V SB I	V_I	64	Total velocity, measured with respect to a geocentric non-rotating, "inertial" reference system, ft/sec.
V I/V S (also in glide phase)	V_I/V_S	87	Ratio of vehicle instantaneous inertial velocity to circular satellite velocity at the instantaneous altitude.
VEL LOSS AA	$V_{AA \text{ LOSS}}$	101	Velocity loss due to total angle of attack, ft/sec.
VEL LOSS CF	$V_{CF \text{ LOSS}}$	97	Velocity loss due to aerodynamic chord force, ft/sec.
VEL LOSS G	$V_G \text{ LOSS}$	99	Velocity loss due to gravity, ft/sec.
VEL LOSS NF	$V_{NF \text{ LOSS}}$	98	Velocity loss due to normal force, ft/sec.
VEL LOSS VTA	$V_{TA \text{ LOSS}}$	100	Velocity loss due to variation in thrust and altitude, ft/sec.
V (GAINED)	V_S	92	Integrating accelerometer velocity, ft/sec ($\int a_{xm} dt$)

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>PRINT CODE</u>	<u>DEFINITION</u>
WEIGHT	W	16	Instantaneous vehicle weight, lb.
WIND AZIMUTH	ϵ_w	42	Wind azimuth angle: angle between the local (instantaneous) meridian and the direction from which the wind is blowing measured in a plane parallel to the local tangent plane, positive clockwise from true north, deg.
WIND SPEED	V_w	41	Local wind speed, measured relative to a rotating earth, ft/sec.
X SB CG	X_{CG}	13	Instantaneous center of gravity measured positive aft of vehicle station zero, ft.
X SB EE	X_{ee}	71	Right-handed cartesian coordinate system with the origin located at mean sea level at the launch site and rotating with the earth: X_{ee} is positive north, Y_{ee} is positive east, and Z_{ee} is positive inward, ft.
Y SB EE	Y_{ee}	72	
Z SB EE	Z_{ee}	73	
D-X SB EE	\dot{X}_{ee}	74, 75	Velocity components relative to the X_{ee}, Y_{ee}, Z_{ee} coordinate system, ft/sec.
D-Y SB EE	\dot{Y}_{ee}		
D-Z SB EE	\dot{Z}_{ee}	76	
X SB G	X	77	Right-handed cartesian coordinate system with the origin located at mean sea level at the launch site and rotating with the earth: X is positive in the direction of the intended flight (launch) azimuth, Y is positive to the right, and Z is positive inward perpendicular to the surface of the earth, ft.
Y SB G	Y	78	
Z SB G	Z	79	
D-X SB G	\dot{X}	80	Velocity components relative to the X, Y, Z coordinate system, ft/sec.
D-Y SB G	\dot{Y}	81	
D-Z SB G	\dot{Z}	82	

GLIDE PHASE PRINTOUT

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>ROW</u>	<u>DEFINITION</u>
A(F)*	A'_f	GP 2	Azimuth angle from the launcher to the location of the impact or intercept point, deg.
ARG PER	$\tilde{\omega}$	GP 6	Argument of perigee: angular distance measured from the ascending node to perigee in the direction of motion, ranging from 0 to 360 degrees, deg.
BETA	β	GP 4	True anomaly at start of glide, deg.
BETA(F)	β_f	GP 2	True anomaly at impact or intercept altitude, deg.
DECLIN	δ	GP 6	Declination of outgoing asymptote of hyperbolic orbit angle between outgoing asymptote and equatorial plane, ranging from -90 degrees at the South celestial pole to +90 degrees at the North celestial pole, deg.
DELTA	Δ	GP 4	Ratio of vehicle instantaneous inertial velocity to circular satellite velocity at the instantaneous altitude.
ECCENTRICITY	e	GP 4	Eccentricity of the instantaneous conic (2-D) trajectory.
E/M	E/M	GP 6	Energy per unit mass of the vehicle based on a zero potential energy at the surface of the earth at the launch point, ft^2/sec^2 .
GAMMA(1)(F)	γ_{1f}	GP 2	Flight path elevation angle at impact on earth or intercept of a predetermined altitude, inertial (corresponding to S_f): angle between the total inertial velocity vector at impact, \bar{V}_{I_f} , and the plane at the surface of the earth perpendicular to the radius vector from the center of the earth to the point of impact, negative for vehicle heading toward the earth, deg.

<u>PRINTOUT</u> <u>SYMBOL</u>	<u>COMMON</u> <u>SYMBOL</u>	<u>ROW</u>	<u>DEFINITION</u>
GAMMA(2)(F)	γ_{2f}	GP 3	Flight path azimuth angle at impact on earth or intercept of a predetermined altitude, inertial (corresponding to S_f): angle between the impact point meridian and the projection of the total inertial velocity vector at impact, V_{I_f} , onto the plane at the surface of the earth perpendicular to the radius vector from the center of the earth to the point of impact, positive clockwise from true north, deg.
I	i	GP 5	Orbit inclination angle: angle between the satellite orbit plane and the earth's equatorial plane measured counterclockwise from due east at the ascending node, ranging from zero degrees for a west-to-east orbit to 180 degrees for an east-to-west orbit, deg.
MU(F)	μ_f	GP 1	Longitude of vehicle impact on earth or intercept of a predetermined altitude (corresponding to S_f), deg.
P	P	GP 5	Orbital period of the instantaneous conic (2-D) trajectory, min.
R(A)	r_a	GP 5	Radial distance from the center of the earth to apogee of the instantaneous conic (2-D) trajectory, n. mi.
R(F)	r_f	GP 3	Radius of the earth at impact, n. mi.
R(PER)	r_p	GP 4	Radial distance from the center of the earth to perigee of the instantaneous conic (2-D) trajectory, n. mi.
RHO(F)	ρ_f	GP 3	Geographic latitude of vehicle impact on earth or intercept of a predetermined altitude, deg.

<u>PRINTOUT SYMBOL</u>	<u>COMMON SYMBOL</u>	<u>ROW</u>	<u>DEFINITION</u>
RHO (PRI)(F)	ρ'_f	GP 1	Geocentric latitude of vehicle impact on earth or intercept of a predetermined altitude, deg.
S(BAR)	\bar{S}	GP 2	Product of the average earth radius and the central angle (in radians) traversed during glide, n. mi.
S(F)	S_f	GP 1	Predicted impact or intercept range, assuming vacuum trajectory, based on instantaneous position and velocity coordinates, n. mi.
TAU	τ	GP 6	Time since or to perigee at start of glide, sec.
TAU(F)	τ_f	GP 2	Time since or to perigee at the impact on earth or intercept of a predetermined altitude, sec.
T(F)	t_f	GP 1	Time to impact on earth or intercept of a predetermined altitude, measured from liftoff, sec.
V(A)	V_a	GP 5	Apogee velocity (inertial) of the glide phase orbit, ft/sec.
V(F)	V_f	GP 1	Total velocity at impact on earth or intercept of a predetermined altitude (corresponding to S_f), assuming vacuum re-entry, measured with respect to a geocentric non-rotating "inertial" reference system, ft/sec.
V(INF)	V_{inf}	GP 5	Hyperbolic excess velocity, ft/sec.
V(P)	V_p	GP 4	Perigee velocity (inertial) of the glide phase, orbit, ft/sec.

PROGRAM AB60 - 3D TRAJECTORY

AB60 BD 19 RR 1 CASE 2

PAGE 1

1	TIME	ALTITUDE	RANGE	THRUST	WEIGHT
2	GAMMA SB 1I*	GAMMA SB 2I*	V SB I	V SB E	D=V SB E
3	THETA SB L*	PSI SB L*	ALPHA	BETA	ALPHA*
4	GAMMA SB 1	GAMMA SB 2	MU	RHO	RHO*
5	PSI SB I	GAMMA(Z)	P SB M	Q SB M	R SB M
6	R SB C	R SB L	PHI SB M	THETA SB M	PSI SB M
7	Q PRESSURE	CHORD FORCE	X SB G	Y SB G	Z SB G
8	MACH	PRESSURE	D=X SB G	D=Y SB G	D=Z SB G
9	A SB XB	G SB L*	X SB EE	Y SB EE	Z SB EE
10	D STAR 1	D=D STAR X1	D=X SB EE	D=Y SB EE	D=Z SB EE
11	E STAR 1	A STAR 1	TAU SB T 1	TAU SB R 1	TAU SB P 1
12	M SB Y	M SB Z	X SB CG	N SB Z / W	TOT IMP VEL
13	VEL LOSS CF	VEL LOSS NF	VEL LOSS G	VEL LOSS VTA	VEL LOSS AA
14	ALPHA * Q	PHI SB L*	DELTA SB Y	DELTA SB Z	V(GAINED)
15	TOTAL IMP 1	TOTAL IMP 2	TOTAL IMP 3	TOTAL IMP 5	Q SB W
16	Q SB L	DELO	A SB YB	A SB ZB	TOTAL IMP 6

GP1	T(F)	S(F)	MU(F)	RHO(PRI)(F)	V(F)
GP2	GAMMA(1)(F)	BETA(F)	TAU(F)	S(BAR)	A*(F)
GP3	RHO(F)	GAMMA(2)(F)	R(F)		
GP4	ECCENTRICITY	R(PER)	V(P)	BETA	DELTA
GP5	I	P	R(A)	V(A)	V(INF)
GP6	TAU	E/M	DECLIN	H(A)	T(A)
GP7	ARG PER				

AE-C DFO TRAJECTORY

STAGE I LIFTOFF

1	0,000	196,900	,619	355956,2	292171,7
2	,0000	90,0000	1255,065	,001	7,056
3	89,820	,000	,000	-,000	,000
4	90,000	180,000	120,621	34,756	34,576
5	196,000	90,000	0,00000	0,00000	0,00000
6	20903246,4	20903049,5	-63,5000	90,0000	0,0000
7	,00	,00	0,0	0,0	-196,9
8	,00	2101,202	0,00	0,00	,00
9	39,198	32,1421	0,0	0,0	-196,9
10	41579,7	-,0	0,00	0,00	-,00
11	-,283	331,338	90,000	0,000	0,000
12	,0	-,0	-1,075	,000	0,000
13	0,000	0,000	0,000	0,000	0,000
14	,000	100,500	,000	-,000	0,000
15	0,0	0,0	0,0	0,0	0,00
16	0,00	0,00	,00	-,00	0,0

1	2,000	211,219	,664	370359,9	289024,8
2	,6845	89,9978	1255,149	14,995	9,085
3	89,820	357,616	,018	,004	,018
4	89,975	271,016	120,621	34,756	34,576
5	196,000	89,975	0,00000	0,00000	0,00000
6	20903200,7	20903049,5	-63,5000	90,0000	0,0000
7	,27	12,29	,0	,0	-211,2
8	,01	2100,114	,00	,01	-14,99
9	41,227	32,1420	,0	-,0	-211,2
10	41579,7	-,0	,00	-,01	-14,99
11	-,263	331,338	90,146	198,205	,006
12	,1	,0	-1,126	,000	92,737
13	,001	,000	64,284	13,459	,000
14	,005	98,311	-,000	-,000	79,278
15	393461,3	0,0	322573,7	0,0	,00
16	,00	,00	-,00	-,00	0,0

BEGIN STAGE I ROLL PROGRAM

1	2,000	211.219	.664	370359,9	289024,8
2	.6645	89,9976	1255,149	14,995	9,085
3	89,820	357.816	.018	.004	.018
4	89,975	271.516	120,621	34,756	34,576
5	196,000	89.975	4,53571	0,00000	0,00000
6	20903260,7	20903049,5	-63,5000	90,0000	0,0000
7	.27	12.29	.0	.0	-211,2
8	.21	2100.114	.00	.01	-14,99
9	41,227	32,1420	.0	.0	-211,2
10	41579,7	-.0	.00	-.01	-14,99
11	-.263	331.336	90,146	198,205	.006
12	.1	.0	-1,126	.000	92,737
13	.001	.000	64,284	13,459	.000
14	.005	98.311	-.000	-.000	79,278
15	393461,3	0,0	322573,7	0,0	.00
16	.00	.00	-.00	-.00	0,0

1	5,000	301.429	.951	393829,4	284066,8
2	2,1390	89,9933	1255,902	46,876	12,451
3	89,819	354.554	.034	.015	.037
4	89,946	270.379	120,621	34,756	34,576
5	196,000	89.946	4,53571	0,00000	0,00000
6	20903350,9	20903049,5	-49,8929	90,0000	0,0000
7	2,59	118.00	.0	.1	-301,4
8	.04	2093.267	.01	.04	-46,88
9	44,593	32,1416	.0	.1	-301,4
10	41579,5	.0	.00	-.04	-46,88
11	-.139	331.336	90,017	184,605	.015
12	2,5	1,1	-1,240	.000	241,501
13	.019	.000	160,710	33,897	.000
14	.096	108.650	-.000	-.000	207,585
15	1035405,1	0,0	823466,0	0,0	.00
16	.00	.00	-.00	-.00	0,0

1	10,000	720,000	2,352	443300,4	275120,2
2	5,7567	89,9818	1261,256	126,510	19,606
3	89,817	349,206	,039	,042	,057
4	89,909	270,177	120,621	34,756	34,576
5	196,000	89,909	4,53571	0,00000	0,00000
6	20903769,5	20903049,5	-27,2143	90,0000	0,0000
7	10,62	816,02	,12	,6	-720,0
8	,11	2061,733	,06	,19	-126,51
9	51,747	32,1405	,10	,6	-720,0
10	41581,7	1,3	,00	,20	-126,51
11	,438	331,337	89,432	161,938	,030
12	19,4	20,8	-1,447	,000	516,686
13	,246	,000	321,416	68,515	,000
14	1,062	125,968	,000	,000	447,925
15	2280845,4	0,0	1608213,2	0,0	,00
16	,00	,00	,00	,00	0,0

BEGIN STAGE I PITCH PROGRAM

BEGIN STAGE-I-YAW PROGRAM

1	10,000	720,000	2,352	443300,4	275120,2
2	5,7567	89,9818	1261,256	126,510	19,606
3	89,817	349,206	,039	,042	,057
4	89,909	270,177	120,621	34,756	34,576
5	196,000	89,909	4,53571	-1,12072	-27251
6	20903769,5	20903049,5	-27,2143	90,0000	0,0000
7	10,62	816,02	,12	,6	-720,0
8	,11	2061,733	,06	,19	-126,51
9	51,747	32,1405	,10	,6	-720,0
10	41581,7	1,3	,00	,20	-126,51
11	,438	331,337	89,432	161,938	,030
12	19,4	20,8	-1,447	,000	516,686
13	,246	,000	321,416	68,515	,000
14	1,062	125,968	,000	,000	447,925
15	2280845,4	0,0	1608213,2	0,0	,00
16	,00	,00	,00	,00	0,0

1	15,000	1627.702	20,266	489303,8	265272,9
2	10,9813	90,5792	1272,625	242,820	26,880
3	84,425	199,312	-2,294	,376	2,324
4	86,546	203,750	120,621	34,756	34,576
5	196,000	86,546	4,53571	-1,12072	-,27251
6	20904677,3	20903049,6	-4,5058	84,2749	,2194
7	66,80	2753,02	24,10	5,5	-1627,7
8	,22	1994,677	14,50	1,97	-242,38
9	59,012	32,1377	-21,6	-11,9	-1627,7
10	41586,9	-1,3	-13,39	-5,89	-242,38
11	1,688	331,309	92,084	139,289	4,232
12	-4056,3	615,2	-1,675	-,003	829,731
13	1,234	-,008	482,041	103,488	,126
14	155,247	-1,235	-,003	,018	724,993
15	3760531,4	0,0	2523247,7	0,0	,03
16	,02	,01	-,02	,12	0,0

1	16,000	1883.578	37,177	497828,2	263227,4
2	12,1980	90,8698	1276,203	270,429	28,344
3	83,302	196,833	-2,374	,410	2,409
4	85,481	201,820	120,621	34,756	34,576
5	196,000	85,481	4,53571	-1,12072	-,27251
6	20904933,2	20903049,6	,0322	83,1447	-,0090
7	82,22	3337,83	41,7	7,5	-1883,6
8	,24	1976,097	21,20	2,16	-269,59
9	60,441	32,1369	-38,0	-18,7	-1883,6
10	41584,6	-3,4	-19,78	-7,92	-269,59
11	2,041	331,290	92,692	134,773	4,870
12	-5124,9	807,9	-1,722	-,004	896,820
13	1,604	,012	514,100	110,476	,177
14	198,095	,834	-,003	,022	784,718
15	4081768,8	0,0	2695572,0	0,0	,04
16	,03	,01	-,03	,15	0,0

END FIRST PITCH RATE - STAGE I

END FIRST ROLL RATE - STAGE I

END FIRST YAW RATE - STAGE I

1	16,000	1883.578	37,177	497823,2	263227,4
2	12,1980	90,8698	1276,203	270,429	28,344
3	83,302	196.833	-2,374	,410	2,409
4	85,481	201.820	120,621	34,756	34,576
5	196,000	85,480	0,00000	0,00000	0,00000
6	20904933,2	20903049,6	,0322	83,1447	=,0090
7	82,22	3337,83	41,7	7,5	=1883,6
8	,24	1976.097	21,20	2,16	=269,59
9	60,441	32,1369	=38,0	=18,7	=1883,6
10	41584,6	-3,4	-19,78	=7,92	=269,59
11	2,041	331,200	92,692	134,773	4,870
12	-5124,9	807,9	-1,722	=,004	896,820
13	1,604	.012	514,100	110,476	,177
14	198,095	.834	=,003	,022	784,718
15	4081708,8	0,0	2695572,0	0,0	,04
16	,03	.01	=,03	,15	0,0

1	20,000	3198.139	178,111	523544,1	254757,6
2	17,5095	92,2026	1299,843	394,315	33,431
3	83,298	196,954	,637	,292	,701
4	82,481	198,709	120,622	34,755	34,575
5	196,000	82,480	0,00000	0,00000	0,00000
6	20906248,2	20903050,1	,0322	83,1447	,0090
7	168,10	6541,04	186,7	16,7	=3198,1
8	,36	1882,849	51,54	2,44	=390,92
9	65,294	32,1328	-174,9	=67,5	=3198,1
10	41558,6	-7,6	=48,88	=16,55	=390,92
11	3,858	331,140	90,862	134,776	4,890
12	2319,3	1063,5	-1,918	,002	1178,710
13	4,009	,018	641,870	138,244	,227
14	117,813	,947	=,004	=,009	1036,430
15	5433009,0	0,0	3389599,2	0,0	,17
16	,14	,03	=,04	=,08	0,0
GP1	50,8068	,289	120,62331	34,57106	1376,816
GP2	-25,777595	180,06330	=877,9457	6,284	199,38193
GP3	34,75109	92,27471	3440,1996		
GP4	,9977180	3,931	1085090,513	179,95865	,0500935
GP5	34,63652	29,88600	3441,118	1239,477	
GP6	884,4076	1,3478082E+06		,918	32,172
GP7	273,23312				

1	20,000	3198.139	178,111	523544,1	254757,6
2	17,5095	92,2026	1299,843	394,315	33,431
3	83,298	196,954	,637	,292	,701
4	82,481	198,709	120,622	34,755	34,575
5	196,000	82,480	0,00000	0,00000	0,00000
6	20906248,2	20903050,1	,0322	83,1447	,0090
7	168,10	6541,04	186,7	16,7	=3198,1
8	,36	1882,849	51,54	2,44	=390,92
9	65,294	32,1328	-174,9	=67,5	=3198,1
10	41558,6	-7,6	=48,88	=16,55	=390,92
11	3,858	331,140	90,862	134,776	4,890
12	2319,3	1063,5	-1,918	,002	1178,710
13	4,009	,018	641,870	138,244	,227
14	117,813	,947	=,004	=,009	1036,430
15	5433009,0	0,0	3389599,2	0,0	,17
16	,14	,03	=,04	=,08	0,0
GP1	50,8068	,289	120,62331	34,57106	1376,816
GP2	-25,777595	180,06330	=877,9457	6,284	199,38193
GP3	34,75109	92,27471	3440,1996		
GP4	,9977180	3,931	1085090,513	179,95865	,0500935
GP5	34,63652	29,88600	3441,118	1239,477	
GP6	884,4076	1,3478082E+06		,918	32,172
GP7	273,23312				

1	20,500	3397.710	204,245	525904,8	253673,9
2	18,2131	92,3739	1303,999	411,163	33,961
3	83,298	196,970	,872	,282	,916
4	82,246	198,562	120,622	34,755	34,575
5	196,000	82,246	0,00000	0,00000	0,00000
6	20906447,8	20903050,1	,0322	83,1447	,0090
7	181,69	7029,31	213,5	17,9	-3397,7
8	,37	1869,010	55,42	2,48	-407,40
9	65,810	32,1322	-200,3	-76,1	-3397,7
10	41554,9	-7,2	-52,59	-17,66	-407,40
11	4,134	331,113	90,584	134,780	4,894
12	3382,7	1092,2	-1,943	,003	1215,350
13	4,438	,019	657,793	141,678	,230
14	166,498	,961	,004	,013	1069,205
15	5608050,7	0,0	3476919,2	0,0	,19
16	,16	,03	,04	,13	0,0
GP1	52,4846	,323	120,62352	34,57051	1385,387
GP2	-26,588798	180,06551	-877,3051	6,519	199,21700
GP3	34,75054	92,44867	3440,1996		
GP4	,9977215	3,925	1085912,665	179,95694	,0502539
GP5	34,64636	29,88679	3441,184	1238,516	
GP6	883,9177	1,3596484E+06		,984	33,186
GP7	273,48232				

BEGIN SECOND PITCH RATE - STAGE 1

1	20,500	3397.710	204,245	525904,8	253673,9
2	18,2131	92,3739	1303,999	411,163	33,961
3	83,298	196,970	,872	,282	,916
4	82,246	198,562	120,622	34,755	34,575
5	196,000	82,246	0,00000	,49109	0,00000
6	20906447,8	20903050,1	,0322	83,1447	,0090
7	181,69	7029,31	213,5	17,9	-3397,7
8	,37	1869,010	55,42	2,48	-407,40
9	65,810	32,1322	-200,3	-76,1	-3397,7
10	41554,9	-7,2	-52,59	-17,66	-407,40
11	4,134	331,113	90,584	134,780	4,894
12	3382,7	1092,2	-1,943	,003	1215,350
13	4,438	,019	657,793	141,678	,230
14	166,498	,961	,004	,013	1069,205
15	5608050,7	0,0	3476919,2	0,0	,19
16	,16	,03	,04	,13	0,0
GP1	52,4846	,323	120,62352	34,57051	1385,387
GP2	-26,588798	180,06551	-877,3051	6,519	199,21700
GP3	34,75054	92,44867	3440,1996		
GP4	,9977215	3,925	1085912,665	179,95694	,0502539
GP5	34,64636	29,88679	3441,184	1238,516	
GP6	883,9177	1,3596484E+06		,984	33,186
GP7	273,48232				

1	25,000	5581,077	536,009	541023,0	243857,2
2	24,7220	94,2426	1353,184	573,966	38,111
3	81,085	196,835	,671	,211	,704
4	80,237	197,721	120,622	34,754	34,574
5	196,000	80,236	0,00000	-,49109	0,00000
6	20908632,2	20903051,1	,0318	80,9348	-,0103
7	331,48	12144,62	551,9	36,1	5581,1
8	,52	1722,934	97,30	2,92	565,65
9	69,779	32,1255	-522,2	-181,0	5581,1
10	41544,9	5,8	-92,72	-29,63	565,65
11	7,162	330,769	89,096	134,825	6,500
12	4338,4	1364,6	-2,282	,005	1556,900
13	0,967	,028	800,680	171,964	,262
14	233,286	,819	,005	-,017	1374,937
15	7222355,6	0,0	4208824,7	0,0	,65
16	,57	,08	-,06	-,19	0,0
GP1	68,2735	,777	120,62630	34,56331	1480,071
GP2	-33,83,260	180,08639	-871,2231	8,750	198,27749
GP3	34,74332	94,34276	3440,1998		
GP4	.9977564	3,865	1094225,083	179,94067	,0521521
GP5	34,8,138	29,89584	3441,939	1228,860	
GP6	879,2537	1,4953378E+06		1,738	42,621
GP7	276,18621				

1	30,000	8879,726	1162,368	540451,4	232841,5
2	31,8265	97,1026	1432,862	771,931	40,565
3	78,626	196,750	,423	,164	,454
4	78,028	197,273	120,623	34,753	34,573
5	196,000	78,025	0,00000	-,49109	0,00000
6	20911032,7	20903053,1	,0313	78,4794	-,0116
7	541,69	19271,06	1188,4	46,2	8879,7
8	,71	1519,941	160,13	3,56	755,13
9	71,986	32,1153	-1129,7	-372,0	8879,7
10	41665,3	48,6	-152,94	-47,56	755,13
11	11,742	330,113	86,204	134,807	8,355
12	6482,9	2518,0	-2,719	,006	1954,854
13	20,505	,238	958,393	203,672	,281
14	246,083	,727	-,009	-,024	1730,643
15	9042115,8	0,0	5162222,4	0,0	1,91
16	1,71	,19	-,08	-,22	0,0
GP1	86,8154	1,681	120,63175	34,54895	1620,182
GP2	-41,259116	180,11096	-864,0342	11,374	197,78778
GP3	34,72893	97,23206	3440,2001		
GP4	.9977991	3,793	1104610,763	179,92153	,0552273
GP5	35,20551	29,91033	3443,125	1216,913	
GP6	873,7705	1,7125886E+06		2,923	53,540
GP7	280,25020				

1	35,000	13131.224	2139,563	527635,4	222414,7
2	38,0693	100,7527	1533,393	974,478	40,824
3	76,169	196,693	,172	,136	,219
4	75,823	197,039	120,624	34,750	34,570
5	196,000	75,817	0,00000	-,49109	0,00000
6	20916187,2	20903056,0	,0308	76,0239	-,0130
7	784,65	30255,03	2179,2	65,9	13131,1
8	,92	1287,400	238,73	4,34	944,77
9	71,950	32,1022	-2076,6	-664,0	13131,1
10	42104,5	135,3	-228,29	-69,97	944,77
11	17,601	329,082	81,994	134,670	10,370
12	2864,7	2261,9	-3,140	,004	2359,374
13	37,370	,043	1114,767	232,392	,287
14	165,106	,669	-,009	-,011	2089,577
15	10793109,6	0,0	6069956,8	0,0	4,46
16	4,14	,32	-,11	-,14	0,0
GP1	105,5529	3,110	120,64032	34,52621	1787,969
GP2	-47 499504	180,13577	-856,8058	13,999	197,54068
GP3	34,70614	100,91834	3440,2006		
GP4	,9978360	3,731	1113776,833	179,90262	,0591081
GP5	36,00407	29,92944	3444,655	1206,384	
GP6	868,4075	1,9986068E+06		4,451	64,476
GP7	285,24705				

1	36,990	15085,217	2043,160	505300,5	218339,1
2	40,2217	102,4047	1577,135	1053,808	36,953
3	75,191	196,683	,077	,127	,149
4	74,940	196,978	120,624	34,749	34,569
5	196,000	74,932	0,00000	-,49109	0,00000
6	20918142,7	20903057,6	,0306	75,0466	-,0135
7	828,45	44199,38	2089,2	74,9	15085,0
8	1,00	1190,695	273,91	4,68	1017,58
9	67,947	32,0962	-2564,4	-813,2	15085,0
10	42420,9	184,0	-262,00	-80,00	1017,58
11	20,255	328,537	79,981	134,572	11,248
12	922,6	1521,8	-3,304	,002	2521,601
13	48,040	,044	1176,576	242,807	,288
14	123,417	,651	-,006	-,004	2230,718
15	11467523,0	0,0	6435353,8	0,0	5,94
16	5,58	,36	-,12	-,07	0,0
GP1	112,8991	3,840	120,64468	34,51460	1859,739
GP2	-49 609771	180,14555	-853,9955	15,022	197,47756
GP3	34,69450	102,57284	3440,2008		
GP4	,9978467	3,713	1116420,483	179,89535	,0607971
GP5	36,46474	29,93819	3445,344	1203,293	
GP6	866,3868	2,1295522E+06		5,139	68,749
GP7	287,41985				

1	36,990	15085.217	2643,160	505300,5	218339,1
2	40,2217	102,4047	1577,135	1053,808	36,953
3	75,191	196.683	,077	,127	,149
4	74,940	196.978	120,624	34,749	34,569
5	196,000	74.932	0,00000	,49109	0,00000
6	20918142,7	20903057,6	,0306	75,0466	,0135
7	828,45	44199,38	2689,2	74,9	=15085,0
8	1,00	1190.695	273,91	4,68	=1017,58
9	67,947	32,0962	-2564,4	-813,2	=15085,0
10	42420,9	184,0	-262,00	-80,00	=1017,58
11	20,255	328.537	79,981	134,572	11,248
12	922,6	1521,8	-3,304	,002	2521,601
13	48,040	,044	1176,576	242,807	,288
14	123,417	.651	,006	,004	2230,718
15	11467523,0	0,0	6435353,8	0,0	5,94
16	5,58	,36	,12	,07	0,0
GP1	112,8991	3.840	120,64468	34,51460	1859,739
GP2	-49.609771	180.14555	-853,9955	15,022	197,47756
GP3	34.69450	102,57284	3440,2008		
GP4	.9978467	3.713	1116420,483	179,89535	,0607971
GP5	36.46474	29.93819	3445,344	1203,293	
GP6	866,3868	2,1295522E+06		5,139	68,749
GP7	287.41985				

1	37,000	15095.395	2645,866	501193,3	218319,4
2	40,2313	102,4129	1577,341	1054,175	36,343
3	75,186	196.683	,077	,127	,149
4	74,935	196.977	120,624	34,749	34,569
5	196,000	74.928	0,00000	,49109	0,00000
6	20918152,9	20903057,6	,0306	75,0417	,0135
7	828,75	44275,57	2691,9	74,9	=15095,2
8	1,00	1190.207	274,08	4,68	=1017,91
9	67,337	32,0961	-2567,0	-814,0	=15095,2
10	42422,7	184,2	-262,17	-80,05	=1017,91
11	20,269	328.534	79,970	134,571	11,252
12	915,2	1518,1	-3,304	,002	2522,393
13	48,105	,044	1176,886	242,858	,288
14	123,243	.651	,006	,004	2231,395
15	11470716,5	0,0	6437192,8	0,0	5,95
16	5,59	,36	,12	,07	0,0
GP1	112,9343	3.843	120,64470	34,51454	1860,089
GP2	-49.619426	180.14559	-853,9821	15,027	197,47728
GP3	34.69444	102,58110	3440,2008		
GP4	.9978467	3.713	1116431,245	179,89532	,0608050
GP5	36.46718	29.93823	3445,348	1203,280	
GP6	866,3776	2,1302046E+06		5,143	68,769
GP7	287.43051				

END SECOND PITCH RATE - STAGE I
 BEGIN THIRD PITCH RATE - STAGE I

1	37,000	15095.395	2645,866	501193,3	218319,4
2	40,2313	102,4129	1577,341	1054,175	36,343
3	75,186	196,683	,077	,127	,149
4	74,935	196,977	120,624	34,749	34,569
5	196,098	74,928	0,00000	-52688	0,00000
6	20918152,9	20903057,6	,0306	75,0417	,0135
7	828,75	44275,57	2691,9	74,9	=15095,2
8	1,00	1190,207	274,08	4,68	=1017,91
9	67,337	32,0961	-2567,0	-814,0	=15095,2
10	42422,7	184,2	-262,17	-80,05	=1017,91
11	20,269	328,534	79,970	134,571	11,252
12	915,2	1518,1	-3,304	,002	2522,393
13	48,105	.044	1176,886	242,858	,288
14	123,243	.651	,006	,004	2231,395
15	11470716,5	0,0	6437192,8	0,0	5,95
16	5,59	,36	,12	,07	0,0
GP1	112,9343	3,843	120,44470	34,51454	1860,089
GP2	-49,619426	180,14559	-853,9821	15,027	197,47728
GP3	34,69444	102,58110	3440,2008		
GP4	,9978467	3,713	1116431,245	179,89532	,0608050
GP5	36,46718	29,93823	3445,348	1203,280	
GP6	866,3776	2,1302046E+06		5,143	68,769
GP7	287,43851				

1	38,614	16754.163	3098,371	179473,4	216424,9
2	40,4357	103,1698	1580,863	1064,720	=10,825
3	74,335	196,669	=,035	,128	,133
4	74,196	196,959	120,625	34,747	34,568
5	196,000	74,187	0,00000	=,52688	0,00000
6	20919813,0	20903058,9	,0304	74,1913	=,0139
7	800,63	44582,62	3150,10	82,6	=16753,9
8	1,01	1112,847	290,09	4,86	=1024,43
9	20,053	32,0910	=3005,12	=947,7	=16753,9
10	42749,4	218,0	=277,51	=84,63	=1024,43
11	22,495	328,037	78,300	134,462	12,046
12	=338,0	1249,2	=3,380	=,001	2600,230
13	59,037	,044	1226,817	249,286	,288
14	106,187	,636	=,014	,004	2291,872
15	11661245,1	0,0	6729260,15	0,0	7,28
16	0,89	,39	=,11	,03	0,0
GP1	116,0639	4,189	120,64674	34,50903	1891,500
GP2	-50,457905	180,14977	=852,7952	15,314	197,43680
GP3	34,68892	103,34064	3440,2011		
GP4	.9978500	3,708	1117236,302	179,89472	,0609432
GP5	36,69761	29,94216	3445,656	1202,308	
GP6	866,2855	2,1891690E+06		5,450	70,594
GP7	288,40276				

SOLID MOTORS BURNOUT (SIX)

1	38,614	16754.163	3098,371	179473,4	216424,9
2	40,4357	103,1698	1580,863	1064,720	=10,825
3	74,335	196,669	=,035	,128	,133
4	74,196	196,959	120,625	34,747	34,568
5	196,000	74,187	0,00000	=,52688	0,00000
6	20919813,0	20903058,9	,0304	74,1913	=,0139
7	800,63	44582,62	3150,10	82,6	=16753,9
8	1,01	1112,847	290,09	4,86	=1024,43
9	20,053	32,0910	=3005,12	=947,7	=16753,9
10	42749,4	218,0	=277,51	=84,63	=1024,43
11	22,495	328,037	78,300	134,462	12,046
12	=338,0	1249,2	=3,380	=,001	2600,230
13	59,037	,044	1226,817	249,286	,288
14	106,187	,636	=,014	,004	2291,872
15	11661245,1	0,0	6729260,15	0,0	7,28
16	0,89	,39	=,11	,03	0,0
GP1	116,0639	4,189	120,64674	34,50903	1891,500
GP2	-50,457905	180,14977	=852,7952	15,314	197,43680
GP3	34,68892	103,34064	3440,2011		
GP4	.9978500	3,708	1117236,302	179,89472	,0609432
GP5	36,69761	29,94216	3445,656	1202,308	
GP6	866,2855	2,1891690E+06		5,450	70,594
GP7	288,40276				

1	39,000	17148.659	3209,434	179662,7	216166,9
2	40,3026	103,2728	1577,610	1060,590	-10,571
3	74,132	196,666	=,054	,129	,140
4	74,012	196,957	120,625	34,747	34,567
5	196,000	74,003	0,00000	=,52688	0,00000
6	20920207,9	20903059,3	,0303	73,9880	=,0140
7	784,14	43425,44	3262,3	84,5	=17148,4
8	1,01	1095,064	292,25	4,89	=1019,52
9	20,277	32,0898	-3112,7	-980,5	=17148,4
10	42834,8	224,5	-279,58	-85,26	=1019,52
11	23,020	327,914	77,908	134,433	12,240
12	-519,9	1251,7	-3,391	=,001	2611,302
13	61,563	,044	1238,731	250,047	,288
14	109,601	,633	=,014	,006	2299,656
15	11661245,1	0,0	6798573,9	0,0	7,59
16	7,20	,40	=,11	,05	0,0
GP1	116,4617	4,236	120,64701	34,50829	1895,488
GP2	-50,560483	180,15039	-852,6465	15,315	197,42787
GP3	34,68818	103,44363	3440,2011		
GP4	.9978503	3,708	1117310,783	179,89523	,0608184
GP5	36,72980	29,94268	3445,695	1202,214	
GP6	866,4527	2,1967305E+06		5,490	70,828
GP7	288,53359				

IGNITION SOLID MOTORS (THREE)

1	39,000	17148.659	3209,434	202972,4	216142,9
2	40,3026	103,2728	1577,610	1060,590	=7,754
3	74,132	196,666	=,054	,129	,140
4	74,012	196,957	120,625	34,747	34,567
5	196,000	74,003	0,00000	=,52688	0,00000
6	20920207,9	20903059,3	,0303	73,9880	=,0140
7	784,14	47821,54	3262,3	84,5	=17148,4
8	1,01	1095,064	292,25	4,89	=1019,52
9	23,095	32,0898	-3112,7	-980,5	=17148,4
10	42834,8	224,5	-279,58	-85,26	=1019,52
11	23,020	327,914	77,908	134,433	12,240
12	-519,6	1251,0	-3,392	=,001	2611,302
13	61,563	,044	1238,731	250,047	,288
14	109,601	,633	=,012	,005	2299,656
15	11661245,1	0,0	6798573,9	0,0	7,59
16	7,20	,40	=,11	,05	0,0
GP1	116,4617	4,236	120,64701	34,50829	1895,488
GP2	-50,560483	180,15030	-852,6465	15,315	197,42787
GP3	34,68818	103,44363	3440,2011		
GP4	.9978503	3,708	1117310,783	179,89523	,0608184
GP5	36,72980	29,94268	3445,695	1202,214	
GP6	866,4527	2,1967305E+06		5,490	70,828
GP7	288,53359				

1	39,290	17352.462	3267.351	293328.9	215951.2
2	40,2857	103,3521	1577,107	1060,394	5,786
3	74,027	196.665	=,062	,129	,144
4	73,915	196.956	120,625	34,747	34,567
5	196,000	73.906	0,00000	-1,52688	0,00000
6	20920411,8	20903059,5	,0303	73,8826	=,0141
7	778,57	47544,24	3320,9	85,5	=17352,2
8	1,01	1085.967	293,92	4,91	=1018,83
9	36,619	32,0892	-3168,7	-997,6	=17352,2
10	42880,1	228,2	-281,18	-85,74	=1018,83
11	23,290	327.849	77,705	134,418	12,342
12	-592,1	1233,3	-3,399	=,002	2619,220
13	62,982	.044	1244,899	250,575	,288
14	111,765	.631	=,008	,004	2305,628
15	11661245,1	13482,6	6834718,9	0,0	7,75
16	7,35	.40	=,11	,05	0,0
GP1	116,7660	4.271	120,64722	34,50772	1898,525
GP2	-50.638642	180,15070	-852,5332	15,334	197,42321
GP3	34,68760	103,52309	3440,2011		
GP4	.9978506	3.707	1117377,499	179,89531	,0607993
GP5	36.75480	29.94307	3445,725	1202,132	
GP6	866,4849	2,2024979E+06		5,520	71,007
GP7	288.63437				

1	39,200	17352.460	3267.351	293328.9	215951.2
2	40,2857	103,3521	1577,107	1060,394	5,786
3	74,027	196.665	=,062	,129	,144
4	73,915	196.956	120,625	34,747	34,567
5	196,000	73.906	0,00000	-1,52688	0,00000
6	20920411,8	20903059,5	,0303	73,8826	=,0141
7	778,57	47544,24	3320,9	85,5	=17352,2
8	1,01	1085.967	293,92	4,91	=1018,83
9	36,619	32,0892	-3168,7	-997,6	=17352,2
10	42880,1	228,2	-281,18	-85,74	=1018,83
11	23,290	327.849	77,705	134,418	12,342
12	-592,1	1233,3	-3,399	=,002	2619,220
13	62,982	.044	1244,899	250,575	,288
14	111,765	.631	=,008	,004	2305,628
15	11661245,1	13482,6	6834718,9	0,0	7,75
16	7,35	.40	=,11	,05	0,0
GP1	116,7660	4.271	120,64722	34,50772	1898,525
GP2	-50.638642	180,15070	-852,5332	15,334	197,42321
GP3	34,68760	103,52309	3440,2011		
GP4	.9978506	3.707	1117377,499	179,89531	,0607993
GP5	36.75480	29.94307	3445,725	1202,132	
GP6	866,4849	2,2024979E+06		5,520	71,007
GP7	288.63437				

1	40,838	18168.482	3583,023	288567,0	215035,8
2	40,3569	103,7438	1578,257	1064,833	5,315
3	73,685	196,659	=,090	,130	,158
4	73,521	196,947	120,625	34,746	34,566
5	196,000	73,511	0,00000	=,52688	0,00000
6	20921228,6	20903060,2	,0302	73,4611	=,0143
7	764,68	47401,08	3559,4	89,5	=18168,2
8	1,02	1050,159	302,19	5,01	=1021,04
9	36,084	32,0867	=3396,8	-1067,1	=18168,2
10	43069,1	244,2	=289,10	=88,11	=1021,04
11	24,369	327,586	76,900	134,353	12,753
12	-769,3	1113,2	-3,436	=,002	2656,584
13	68,654	,045	1269,540	253,186	,288
14	120,891	.625	=,008	.005	2334,708
15	11661245,1	100681,4	6980279,6	0,0	8,37
16	7,96	.42	=,11	.08	0,0
GP1	118,2417	4,449	120,64826	34,50490	1913,247
GP2	-51,012648	180,15263	=891,9862	15,463	197,40483
GP3	34,68477	103,9159	3440,2013		
GP4	.9978519	3,705	1117698,216	179,89511	,0608448
GP5	36,88031	29,94495	3445,872	1201,737	
GP6	866,4688	2,2305799E+06		5,666	71,880
GP7	289,13035				

1	45,000	23320,237	5138,312	311979,0	209191,4
2	40,9853	106,5678	1591,595	1103,667	10,387
3	70,970	196,632	=,085	,136	,160
4	70,881	196,899	120,627	34,742	34,562
5	196,000	70,867	0,00000	=,52688	0,00000
6	20926385,3	20903065,1	,0295	70,8267	=,0157
7	686,72	47419,84	5212,7	116,1	=23319,6
8	1,08	845,554	361,70	5,70	=1042,70
9	40,690	32,0708	=4978,8	=1548,5	=23319,6
10	44538,9	344,5	=346,11	=105,17	=1042,70
11	30,978	325,704	71,966	133,345	15,552
12	-200,3	320,5	-3,644	=,002	2898,676
13	104,519	,047	1422,262	267,854	,289
14	110,437	.591	=,002	.001	2526,267
15	11661245,1	682115,9	7898037,6	0,0	12,20
16	11,68	.52	=,11	.07	0,0
GP1	127,7443	5,748	120,65592	34,48420	2008,501
GP2	-53,212066	180,16496	=848,5586	16,333	197,30691
GP3	34,66482	106,74706	3440,2021		
GP4	.9978558	3,699	1118551,631	179,89294	,0613666
GP5	37,87786	29,95745	3446,838	1200,485	
GP6	866,1442	2,4175198E+06		6,630	77,579
GP7	292,59330				

1	50,000	28631.635	7110,088	339018,1	202951,7
2	42,0726	110,1849	1022,110	1170,531	16,562
3	68,336	196,608	,120	,142	,186
4	68,042	196,857	120,628	34,737	34,557
5	196,000	68,023	0,00000	,52688	0,00000
6	20931702,6	20903071,1	,0287	68,1923	,0170
7	641,46	47009,87	7204,3	146,8	=28630,4
8	1,17	669,763	438,01	6,58	=1085,47
9	46,292	32,0545	=6884,7	=2126,8	=28630,4
10	46529,8	454,2	=419,23	=127,06	=1085,47
11	37,364	323,299	67,177	133,182	18,858
12	488,6	576,4	=3,803	,003	3164,815
13	141,607	,048	1572,381	279,920	,290
14	119,186	,567	=,003	=,003	2743,252
15	11661245,1	1379754,5	8827522,1	0,0	16,03
16	15,42	,61	=,11	=,09	0,0
GP1	138,1625	7,496	120,66623	34,45635	2115,070
GP2	-55,244997	180,17865	=844,9468	17,436	197,23525
GP3	34,63611	110,37213	3440,2030		
GP4	,9978460	3,717	1115824,149	179,88826	,0625511
GP5	39,37752	29,97218	3447,950	1203,026	
GP6	865,2214	2,6374329E+06		7,740	83,944
GP7	296,72182				

END THIRD PITCH RATE - STAGE 1

BEGIN FOURTH PITCH RATE - STAGE I

1	50,000	28631.635	7110,088	339018,1	202951,7
2	42,0726	110,1849	1022,110	1170,531	16,562
3	68,336	196,608	,120	,142	,186
4	68,042	196,857	120,628	34,737	34,557
5	196,000	68,023	0,00000	=,51793	0,00000
6	20931702,6	20903071,1	,0287	68,1923	,0170
7	641,46	47009,87	7204,3	146,8	=28630,4
8	1,17	669,763	438,01	6,58	=1085,47
9	46,292	32,0545	=6884,7	=2126,8	=28630,4
10	46529,8	454,2	=419,23	=127,06	=1085,47
11	37,364	323,299	67,177	133,182	18,858
12	488,6	576,4	=3,803	,003	3164,815
13	141,607	,048	1572,381	279,920	,290
14	119,186	,567	=,003	=,003	2743,252
15	11661245,1	1379754,5	8827522,1	0,0	16,03
16	15,42	,61	=,11	=,09	0,0
GP1	138,1625	7,496	120,66623	34,45635	2115,070
GP2	-55,244997	180,17865	=844,9468	17,436	197,23525
GP3	34,63611	110,37213	3440,2030		
GP4	,9978460	3,717	1115824,149	179,88826	,0625511
GP5	39,37752	29,97218	3447,950	1203,026	
GP6	865,2214	2,6374329E+06		7,740	83,944
GP7	296,72182				

1	55,600	34216,947	9509,493	362985,2	196273,9
2	43,5502	114,7001	1675,155	1270,174	23,300
3	65,749	196,593	,425	,146	,450
4	65,150	196,820	120,631	34,730	34,551
5	196,000	65,123	0,00000	,51793	0,00000
6	20937295,2	20903078,4	,0279	65,6026	,0183
7	613,59	43476,12	9620,1	182,3	=34214,7
8	1,30	518,161	534,26	7,70	=1152,32
9	52,375	32,0373	-9202,9	=2828,6	=34214,7
10	49113,2	583,1	-511,45	=154,67	=1152,32
11	43,530	320,164	62,457	132,391	22,844
12	3570,3	1227,6	-3,973	,009	3457,858
13	178,203	,055	1719,412	289,682	,295
14	275,834	,549	,007	,019	2989,937
15	11661245,1	2197164,9	9767400,2	0,0	20,19
16	19,37	,81	,11	,32	0,0
QP1	149,7085	9,853	120,68015	34,41882	2237,682
QP2	-57,080489	180,19478	-841,0634	18,881	197,18626
QP3	34,59849	114,89614	3440,2042		
QP4	,9978097	3,782	1106300,912	179,88032	,0646052
QP5	41,55932	29,99008	3449,260	1212,899	
QP6	863,6327	2,9045157E+06		9,047	91,070
QP7	301,37115				

1	60,000	40195,092	12440,971	379379,3	189292,0
2	45,1759	120,1041	1753,963	1402,744	29,634
3	63,162	196,581	,679	,150	,695
4	62,310	196,791	120,634	34,723	34,543
5	196,000	62,275	0,00000	,51793	0,00000
6	20943282,1	20903087,2	,0271	63,0130	,0196
7	572,42	38166,89	12583,7	224,2	=40191,3
8	1,45	389,471	652,53	9,09	=1241,70
9	57,996	32,0189	-12034,4	=3684,1	=40191,3
10	52405,2	738,5	-624,75	=188,60	=1241,70
11	49,428	316,009	57,820	131,463	27,845
12	6973,4	1536,7	-4,151	,015	3775,956
13	212,404	,076	1862,890	297,391	,311
14	397,969	,536	,008	,036	3266,121
15	11661245,1	3107730,3	10716380,0	0,0	24,89
16	23,66	1,23	,11	,51	0,0
QP1	162,3712	12,985	120,69066	34,36893	2379,345
QP2	-58,624182	180,21460	-836,9020	20,776	197,15693
QP3	34,54848	120,30932	3440,2057		
QP4	,9977281	3,924	1085972,764	179,86858	,0676542
QP5	44,55347	30,01204	3450,803	1235,000	
QP6	861,4490	3,2318298E+06		10,585	98,912
QP7	306,20927				

END-FOURTH PITCH-RATE - STAGE I

BEGIN FIFTH PITCH RATE - STAGE I

1	60,000	40195.092	12440,971	379379,3	189292,0
2	45,1759	120,1041	1753,963	1402,744	29,634
3	63,162	196.581	,679	,150	,695
4	62,310	196.791	120,634	34,723	34,543
5	196,000	62.275	0,00000	-64915	0,00000
6	20943282,1	20903087,2	,0271	63,0130	,0196
7	572,42	38166.89	12583,7	224,2	=40191,3
8	1,45	389.471	652,53	9,09	=1241,70
9	57,996	32,0189	-12034,4	=3684,1	=40191,3
10	52405,2	738,5	=624,75	=188,60	=1241,70
11	49,428	316.009	57,820	131,463	27,845
12	6973,4	1536,7	-4,151	,015	3775,956
13	212,404	,076	1862,990	297,391	,311
14	397,969	,536	=,008	=,036	3266,121
15	11661245,1	3107730,3	10716380,0	0,0	24,89
16	23,66	1.23	=,11	=,51	0,0
GP1	162,3712	12,985	120,69866	34,36893	2379,345
GP2	-58.624182	180.21460	=836,9020	20,776	197,15693
GP3	34.54848	120.30932	3440,2057		
GP4	.9977281	3.924	1085972,764	179,86858	,0676542
GP5	44.55347	30.01204	3450,803	1235,000	
GP6	861,4490	3,2318298E+06		10,585	98,912
GP7	306.20927				

1	65,000	46664,709	16019,743	386097,7	182152,9
2	46,5803	126,3345	1858,666	1564,643	34,956
3	59,921	196,558	,284	,153	,323
4	59,464	196,768	128,637	34,713	34,534
5	196,000	59,420	0,00000	,64915	0,00000
6	20949762,5	20903098,1	,0259	59,7672	,0211
7	522,52	32144,76	16193,5	273,8	46658,4
8	1,62	285,753	795,93	10,80	1347,03
9	62,519	31,9990	-15490,7	-4726,7	46658,4
10	56544,5	921,5	-762,12	-229,77	1347,03
11	54,929	310,448	53,800	130,081	34,794
12	3135,5	1694,2	-4,333	,006	4114,114
13	242,867	,091	2002,810	303,338	,324
14	168,582	,516	,008	,016	3567,868
15	11661245,1	4068771,6	11672702,5	0,0	30,04
16	28,42	1,63	,11	,20	0,0
QP1	175,8789	17,080	120,72287	34,30372	2540,602
QP2	-59,737146	180,23963	-832,5538	23,240	197,14135
QP3	34,48311	126,54784	3440,2075		
QP4	.9975743	4,193	1050627,030	179,85257	,0717039
QP5	48,42309	30,03871	3452,581	1275,793	
QP6	858,8900	3,6288652E+06		12,357	107,271
QP7	310,87610				

1	76,000	53683,664	20375,561	382208,9	175042,4
2	47,4302	133,1089	1986,645	1749,826	38,793
3	56,683	196,540	,061	,158	,170
4	56,570	196,751	120,641	34,702	34,522
5	196,000	56,514	0,00000	,64915	0,00000
6	20956794,6	20903111,2	,0247	56,5215	,0225
7	467,15	25961,55	20586,6	332,8	53673,5
8	1,81	204,259	965,36	12,84	1459,38
9	65,481	31,9775	-19697,4	-5994,3	53673,5
10	61600,5	1128,5	-924,42	-278,44	1459,38
11	59,815	302,998	49,985	128,488	43,696
12	-627,1	1634,5	-4,555	,001	4465,605
13	269,038	,094	2138,462	307,820	,326
14	79,260	,500	,008	,003	3888,707
15	11661245,1	5032998,0	12634428,9	0,0	35,58
16	33,78	1,81	,11	,04	0,0
QP1	189,8157	22,274	120,75355	34,22103	2719,863
QP2	-60,301236	180,27160	-828,1713	26,408	197,13468
QP3	34,40622	133,32814	3440,2096		
QP4	.9973148	4,644	998144,095	179,83179	,0766617
QP5	53,02274	30,07047	3454,565	1341,929	
QP6	856,2409	4,1007850E+06		14,334	115,873
QP7	314,98166				

1	75,000	61264.564	25627.495	370386.4	168151.7
2	47,5717	139,9158	2133.852	1950,568	41,316
3	53,447	196.523	=.405	,165	,438
4	53,679	196.739	120,646	34,688	34,508
5	196,000	53.608	0,00000	=,64915	0,00000
6	20964391,3	20903127,1	,0234	53,2757	=,0239
7	404,03	19879.96	25883,7	402,8	=61248,5
8	2,01	142.170	1157,19	15,21	=1570,16
9	67,066	31,9543	=24770,0	=7521,7	=61248,5
10	67859,5	1353,8	=1108,17	=333,59	=1570,16
11	63,790	293.240	46,470	126,697	54,994
12	-3714,4	1514,3	=4,791	=,007	4822,172
13	290,454	.098	2269,570	311,112	,331
14	176,918	.489	=,008	.019	4220,565
15	11661245,1	5951618,0	13599683,2	0,0	41,58
16	39,50	2,08	=,10	,25	0,0
GP1	203,7524	28.575	120,79073	34,12070	2913,624
GP2	-60.293670	180,31185	=823,9176	30,378	197,13469
GP3	34.29965	140,13765	3440,2122		
GP4	.9969190	5.333	931364,807	179,80591	,0823489
GP5	57.95322	30,10730	3456,700	1436,973	
GP6	853,7677	4,6470688E+06		16,460	124,451
GP7	318.25206				

END FIFTH PITCH RATE - STAGE 1

BEGIN SIXTH PITCH RATE - STAGE 1

1	75,000	61264.564	25627.495	370386.4	168151.7
2	47,5717	139,9158	2133.852	1950,568	41,316
3	53,447	196.523	=.405	,165	,438
4	53,679	196.739	120,646	34,688	34,508
5	196,000	53.608	0,00000	=,56465	0,00000
6	20964391,3	20903127,1	,0234	53,2757	=,0239
7	404,03	19879.96	25883,7	402,8	=61248,5
8	2,01	142.170	1157,19	15,21	=1570,16
9	67,066	31,9543	=24770,0	=7521,7	=61248,5
10	67859,5	1353,8	=1108,17	=333,59	=1570,16
11	63,790	293.240	46,470	126,697	54,994
12	-3714,4	1514,3	=4,791	=,007	4822,172
13	290,454	.098	2269,570	311,112	,331
14	176,918	.489	=,008	.019	4220,565
15	11661245,1	5951618,0	13599683,2	0,0	41,58
16	39,50	2,08	=,10	,25	0,0
GP1	203,7524	28.575	120,79073	34,12070	2913,624
GP2	-60.293670	180,31185	=823,9176	30,378	197,13469
GP3	34.29965	140,13765	3440,2122		
GP4	.9969190	5.333	931364,807	179,80591	,0823489
GP5	57.95322	30,10730	3456,700	1436,973	
GP6	853,7677	4,6470688E+06		16,460	124,451
GP7	318.25206				

1	76,190	63149.939	27021,159	362985,3	166539,7
2	47,5002	141,4828	2170,893	1999,676	40,993
3	52,777	196,521	=,393	,167	,428
4	52,997	196,737	120,648	34,684	34,505
5	196,000	52,923	0,00000	=,56465	0,00000
6	20966280,9	20903131,3	,0231	52,6038	=,0241
7	388,95	18709,58	27289,5	421,3	=63132,1
8	2,07	129,923	1205,49	15,82	=1595,39
9	66,511	31,9485	=26116,2	=7926,9	=63132,1
10	69503,5	1409,3	=1154,43	=347,48	=1595,39
11	64,567	290,562	45,607	126,302	57,970
12	-3434,0	1460,0	-4,846	=,006	4906,835
13	294,868	,100	2300,070	311,749	,334
14	165,901	,488	=,008	,018	4300,177
15	11661245,1	6158598,3	13829741,4	0,0	43,06
16	40,88	2,18	=,10	,23	0,0
GP1	207,0225	30,227	120,80048	34,09440	2961,319
GP2	-60,214283	180,32271	=822,9416	31,443	197,13547
GP3	34,27328	141,70476	3440,2129		
GP4	,9968023	5,536	914091,365	179,79903	,0837821
GP5	59,12316	30,11676	3457,223	1463,820	
GP6	853,2317	4,7873079E+06		16,981	126,461
GP7	318.89975				

1	76,190	63149.939	27021,159	362985,3	166539,7
2	47,5002	141,4828	2170,893	1999,676	40,993
3	52,777	196,521	=,393	,167	,428
4	52,997	196,737	120,648	34,684	34,505
5	196,000	52,923	0,00000	=,56465	0,00000
6	20966280,9	20903131,3	,0231	52,6038	=,0241
7	388,95	18709,58	27289,5	421,3	=63132,1
8	2,07	129,923	1205,49	15,82	=1595,39
9	66,511	31,9485	=26116,2	=7926,9	=63132,1
10	69503,5	1409,3	=1154,43	=347,48	=1595,39
11	64,567	290,562	45,607	126,302	57,970
12	-3434,0	1460,0	-4,846	=,006	4906,835
13	294,868	,100	2300,070	311,749	,334
14	165,901	,488	=,008	,018	4300,177
15	11661245,1	6158598,3	13829741,4	0,0	43,06
16	40,88	2,18	=,10	,23	0,0
GP1	207,0225	30,227	120,80048	34,09440	2961,319
GP2	-60,214283	180,32271	=822,9416	31,443	197,13547
GP3	34,27328	141,70476	3440,2129		
GP4	,9968023	5,536	914091,365	179,79903	,0837821
GP5	59,12316	30,11676	3457,223	1463,820	
GP6	853,2317	4,7873079E+06		16,981	126,461
GP7	318.89975				

1	77,814	65755.042	29003,503	190436,5	165042,9
2	47,1126	142,9329	2194,546	2033,517	8,642
3	51,864	196,518	=,390	,173	,426
4	52,080	196,739	120,650	34,679	34,500
5	196,000	52,000	0,00000	=,56465	0,00000
6	20968892,0	20903137,3	,0227	51,6868	=,0245
7	354,34	16842,53	29289,1	447,5	=65734,5
8	2,10	114,721	1251,84	16,51	=1602,44
9	33,841	31,9405	=28031,1	=8503,4	=65734,5
10	71839,6	1461,3	=1198,80	=360,92	=1602,44
11	65,503	286,727	44,477	125,751	62,222
12	=3075,5	1365,4	=4,897	=,006	4988,162
13	300,482	,103	2341,248	312,438	,336
14	151,067	,487	=,014	,031	4375,201
15	11661245,1	6263073,0	14140769,3	0,0	45,06
16	42,75	2,31	=,09	,21	0,0
GP1	210,0701	31,832	120,80992	34,06883	3006,574
GP2	=60,111470	180,33339	=822,0433	32,365	197,13426
GP3	34,24765	143,15381	3440,2139		
GP4	,9966836	5,743	897466,567	179,79435	,0847002
GP5	60,21513	30,12590	3457,716	1490,635	
GP6	853,2544	4,9225376E+06		17,472	128,337
GP7	319,46679				

SOLID MOTORS BURNOUT (THREE)

1	77,814	65755.042	29003,503	190436,5	165042,9
2	47,1126	142,9329	2194,546	2033,517	8,495
3	51,864	196,518	=,390	,173	,426
4	52,080	196,739	120,650	34,679	34,500
5	196,000	52,000	0,00000	=,56465	0,00000
6	20968892,0	20903137,3	,0227	51,6868	=,0245
7	354,34	17594,38	29289,1	447,5	=65734,5
8	2,10	114,721	1251,84	16,51	=1602,44
9	33,694	31,9405	=28031,1	=8503,4	=65734,5
10	71839,6	1461,3	=1198,80	=360,92	=1602,44
11	65,503	286,727	44,477	125,751	62,222
12	=3075,5	1365,4	=4,897	=,006	4988,162
13	300,482	,103	2341,248	312,438	,336
14	151,067	,487	=,014	,031	4375,201
15	11661245,1	6263073,0	14140769,3	0,0	45,06
16	42,75	2,31	=,09	,21	0,0
GP1	210,0701	31,832	120,80992	34,06883	3006,574
GP2	=60,111470	180,33339	=822,0433	32,365	197,13426
GP3	34,24765	143,15381	3440,2139		
GP4	,9966836	5,743	897466,567	179,79435	,0847002
GP5	60,21513	30,12590	3457,716	1490,635	
GP6	853,2544	4,9225376E+06		17,472	128,337
GP7	319,46679				

1	80,000	69248.625	31767.005	190642.1	163588.0
2	46,3632	144,3590	2205,380	2053,504	9,782
3	50,635	196,514	=,376	,183	,419
4	50,838	196,747	120,652	34,672	34,492
5	196,000	50,751	0,00000	=,56465	0,00000
6	20972393,9	20903145,6	,0222	50,4524	=,0250
7	304,48	15019,36	32076,9	484,5	=69224,0
8	2,12	97,132	1299,13	17,33	=1590,23
9	34,541	31,9298	=30700,7	=9307,3	=69224,0
10	75087,5	1509,8	=1244,03	=374,75	=1590,23
11	66,513	281,391	43,088	124,989	68,148
12	-2520,3	1227,3	=4,947	=,005	5070,264
13	307,445	,106	2395,851	312,981	,338
14	127,493	,485	=,012	,025	4449,797
15	11661245,1	6263073,0	14557293,9	0,0	47,53
16	45,06	2,47	=,09	,18	0,0
GP1	213,0337	33,472	120,81953	34,04271	3051,362
GP2	-59,972694	180,34440	=821,1909	33,172	197,13109
GP3	34,22146	144,57780	3440,2152		
GP4	.9965557	5,966	880528,564	179,79193	,0851255
GP5	61,29723	30,13508	3458,198	1519,000	
GP6	853,8803	5,0584655E+06		17,951	130,172
GP7	319.99523				

1	80,000	69248.625	31767.005	190642.1	163588.0
2	46,3632	144,3590	2205,380	2053,504	9,782
3	50,635	196,514	=,376	,183	,419
4	50,838	196,747	120,652	34,672	34,492
5	196,000	50,751	0,00000	=,56465	0,00000
6	20972393,9	20903145,6	,0222	50,4524	=,0250
7	304,48	15019,36	32076,9	484,5	=69224,0
8	2,12	97,132	1299,13	17,33	=1590,23
9	34,541	31,9298	=30700,7	=9307,3	=69224,0
10	75087,5	1509,8	=1244,03	=374,75	=1590,23
11	66,513	281,391	43,088	124,989	68,148
12	-2520,3	1227,3	=4,947	=,005	5070,264
13	307,445	,106	2395,851	312,981	,338
14	127,493	,485	=,012	,025	4449,797
15	11661245,1	6263073,0	14557293,9	0,0	47,53
16	45,06	2,47	=,09	,18	0,0
GP1	213,0337	33,472	120,81953	34,04271	3051,362
GP2	-59,972694	180,34440	=821,1909	33,172	197,13109
GP3	34,22146	144,57780	3440,2152		
GP4	.9965557	5,966	880528,564	179,79193	,0851255
GP5	61,29723	30,13508	3458,198	1519,000	
GP6	853,8803	5,0584655E+06		17,951	130,172
GP7	319.99523				

1	85,000	77144.045	38489.754	191167.0	160258.9
2	44,5407	147,6587	2238.857	2109,462	12,565
3	47,826	196.505	=,287	,208	,355
4	47,940	196.762	120,659	34,654	34,475
5	196,000	47.833	0,00000	=,56465	0,00000
6	20980309,6	20903165,9	,0209	47,6292	=,0260
7	218,87	10586,35	38859,6	576,1	=77108,0
8	2,16	66.892	1415,93	19,36	=1563,52
9	36,254	31,9056	=37195,5	-11265,0	=77108,0
10	82900,2	1614,1	=1355,75	=408,89	=1563,52
11	67,809	268.958	40,430	123,184	82,027
12	-1344,2	972,6	-5,060	=,003	5260,912
13	320,012	.111	2517,000	313,947	,343
14	77,639	.482	=,010	.013	4626,912
15	11661245,1	6263073,0	15511877,2	0,0	52,33
16	49,56	2,76	=,07	,10	0,0
GP1	219,7993	37.520	120,84327	33,97823	3156,700
GP2	-59.510647	180.37210	=819,3317	35,240	197,12626
GP3	34.15682	147,37162	3440,2186		
GP4	.9962117	6.565	839315,155	179,78519	,0864340
GP5	63.83165	30,15724	3459,296	1592,808	
GP6	855,3034	5,3860888E+06		19,044	134,414
GP7	321.11405				

END SIXTH PITCH RATE - STAGE I
 BEGIN SEVENTH PITCH RATE - STAGE I

1	85,000	77144.045	38489.754	191167.0	160258.9
2	44,5407	147,6587	2238.857	2109,462	12,565
3	47,826	196.505	=,287	,208	,355
4	47,940	196.762	120,659	34,654	34,475
5	196,000	47.833	0,00000	=,58700	0,00000
6	20980309,6	20903165,9	,0209	47,6292	=,0260
7	218,87	10586,35	38859,6	576,1	=77108,0
8	2,16	66.892	1415,93	19,36	=1563,52
9	36,254	31,9056	=37195,5	-11265,0	=77108,0
10	82900,2	1614,1	=1355,75	=408,89	=1563,52
11	67,809	268.958	40,430	123,184	82,027
12	-1344,2	972,6	-5,060	=,003	5260,912
13	320,012	.111	2517,000	313,947	,343
14	77,639	.482	=,010	.013	4626,912
15	11661245,1	6263073,0	15511877,2	0,0	52,33
16	49,56	2,76	=,07	,10	0,0
GP1	219,7993	37.520	120,84327	33,97823	3156,700
GP2	-59.510647	180.37210	=819,3317	35,240	197,12626
GP3	34.15682	147,37162	3440,2186		
GP4	.9962117	6.565	839315,155	179,78519	,0864340
GP5	63.83165	30,15724	3459,296	1592,808	
GP6	855,3034	5,3860888E+06		19,044	134,414
GP7	321.11405				

1	98,000	84910.163	45819.171	191573.0	156927.1
2	42,5545	150,9452	2284.143	2178.871	15,187
3	44,906	196.494	=,247	,233	,340
4	44,979	196.776	120,666	34,634	34,455
5	196,000	44.853	0,00000	=,58700	0,00000
6	20988097,7	20903188,0	,0196	44,6942	=,0271
7	160,76	7576.23	46255.8	678.4	=84859.1
8	2,22	46.543	1544.49	21.59	=1536.73
9	37,724	31,8819	=44276.9	=13402.0	=84859.1
10	01221.5	1714.0	=1478.71	=446.47	=1536.73
11	67,903	257.143	38,458	121,260	95,468
12	=826.9	780.2	=5,174	=,002	5455,728
13	320,140	.114	2632,589	314,632	,347
14	54,632	.480	=,008	,008	4811,914
15	11661245,1	6263073,0	16468757,0	0,0	56,21
16	53,23	2.98	=,06	,06	0,0
GP1	226,4680	41.972	120,86936	33,90730	3265,900
GP2	-58.849446	180,40345	=817,6237	37,613	197,12344
GP3	34,08571	151,15113	3440,2222		
GP4	.9957864	7.306	795538,788	179,77702	,0881987
GP5	66.39385	30,18103	3460,379	1679,572	
GP6	856,7704	5,7374726E+06		20,120	138,661
GP7	322.09411				

1	98,000	92542.822	53812.869	191900,7	153592,5
2	40,4039	154,1519	2341,279	2261,204	17,731
3	41,988	196.483	=,168	,258	,308
4	41,983	196.787	120,673	34,613	34,434
5	196,000	41.834	0,00000	=,58700	0,00000
6	20995754,4	20903212,0	,0181	41,7592	=,0280
7	120,46	5522.53	54323.8	792,3	=92472.4
8	2,29	32.717	1684,60	24,00	=1508,17
9	39,042	31,8586	=52001,0	=15735,3	=92472,4
10	100039,9	1613.6	=1612,73	=487,41	=1508,17
11	67,086	246.799	36,948	119,334	107,468
12	=412,0	631,9	=5,288	=,001	5654,895
13	335,838	.116	2742,237	315,118	,350
14	37,157	.480	=,006	,004	5003,897
15	11661245,1	6263073,0	17427475,2	0,0	59,43
16	56,28	3.15	=,05	,03	0,0
GP1	232,9666	46.818	120,89770	33,83011	3379,055
GP2	-57.997268	180,43863	=816,0908	40,289	197,12146
GP3	34,00832	154,34952	3440,2261		
GP4	.9952671	8.211	750318,405	179,76768	,0904214
GP5	68.92497	30,20658	3461,430	1779,793	
GP6	858,3374	6,1141997E+06		21,165	142,860
GP7	322.93159				

1	96,000	94052.450	55496.292	191959.3	152925.2
2	39,9552	154,7786	2354,145	2279,189	18,235
3	41,405	196.481	=,151	,263	,303
4	41,381	196.782	120,675	34,609	34,430
5	196,000	41.223	0,00000	=,58700	0,00000
6	20997269,1	20903217,1	,0179	41,1722	=,0282
7	113,96	5106,26	56023,0	816,6	=93977,5
8	2,31	30,528	1713,98	24,50	=1502,12
9	39,293	31,8540	=53627,7	=16227,0	=93977,5
10	101863,5	1833,7	=1640,83	=495,99	=1502,12
11	66,838	244.943	36,692	118,951	109,655
12	=346,4	605,9	=5,313	=,001	5695,267
13	336,960	,116	2763,421	315,197	,351
14	34,573	,480	=,006	,003	5043,067
15	11661245,1	6263073,0	17619406,2	0,0	60,01
16	56,83	3,18	=,05	,03	0,0
GP1	234,2409	47.833	120,90363	33,81394	3402,180
GP2	=57.805177	180,44620	=815,8070	40,859	197,12110
GP3	33.99212	154,97435	3440,2270		
GP4	.9951508	8.413	741202,699	179,76570	,0909215
GP5	69.42280	30,21191	3461,636	1801,470	
GP6	858,6670	6,1927690E+06		21,369	143,690
GP7	323.08234				

JETTISON SOLID MOTOR CASINGS (NINE)

1	96,000	15.479	9,134	191959,3	138606,5
2	39,9552	154,7786	2354,145	2279,189	23,050
3	41,405	196.481	=,151	,263	,303
4	41,381	196.789	120,675	34,609	34,430
5	196,000	41.228	0,00000	=,58700	0,00000
6	20997269,1	20903217,1	,0179	41,1722	=,0282
7	113,96	1940,14	56023,0	816,6	=93977,5
8	2,31	30,528	1713,98	24,50	=1502,12
9	44,108	31,8540	=53627,7	=16227,0	=93977,5
10	101863,5	1833,7	=1640,83	=495,99	=1502,12
11	66,838	244.943	36,692	118,951	109,655
12	=1834,9	3209,6	=7,908	=,000	5695,267
13	336,960	,115	2763,421	315,197	,351
14	34,573	,480	=,029	,016	5043,067
15	11661245,1	6263073,0	17619406,2	0,0	60,01
16	56,83	3,18	=,05	,03	0,0
GP1	234,2409	47.833	120,90363	33,81394	3402,180
GP2	=57.805177	180,44620	=815,8070	40,859	197,12110
GP3	33.99212	154,97435	3440,2270		
GP4	.9951508	8.413	741202,699	179,76570	,0909215
GP5	69.42280	30,21191	3461,636	1801,470	
GP6	858,6670	6,1927690E+06		21,369	143,690
GP7	323.08234				

1	100,000	16.467	10,295	191866,6	135938,6
2	38,1691	157,5032	2427,069	2375,319	25,020
3	39,072	196.472	0,088	,281	,294
4	38,986	196.793	120,682	34,590	34,412
5	196,000	38.813	0,00000	0,58700	0,00000
6	21003293,5	20903238,4	,0167	38,8242	,0289
7	93,37	1530,17	63149,8	919,0	99960,5
8	2,40	23,213	1850,64	26,72	1488,81
9	45,049	31,8356	60450,1	-18289,8	99960,5
10	109393,3	1931,8	1771,58	535,79	1488,81
11	65,630	238,211	35,789	117,439	117,700
12	877,1	2814,6	7,908	0,000	5875,498
13	338,579	,117	2845,603	315,498	,353
14	27,482	,480	,025	,008	5221,380
15	11661245,1	6263073,0	18387066,5	0,0	62,19
16	58,91	3,28	,04	,01	0,0
GP1	239,8516	52,561	120,93125	33,73861	3508,091
GP2	-56,870843	180,48185	814,6204	43,703	197,12068
GP3	33,91660	157,69064	3440,2305		
GP4	,9945765	9,415	700566,487	179,75399	,0937514
GP5	71,59850	30,23682	3462,541	1904,917	
GP6	859,7370	6,5593907E+06		22,267	147,367
GP7	323,69152				

END SEVENTH PITCH RATE - STAGE I

BEGIN SECOND ROLL RATE - STAGE I

BEGIN SECOND YAW RATE - STAGE I

1	100,000	16.467	10,295	191866,6	135938,6
2	38,1691	157,5032	2427,069	2375,319	25,020
3	39,072	196.472	0,088	,281	,294
4	38,986	196.793	120,682	34,590	34,412
5	196,000	38.813	1,40000	0,00000	1,66889
6	21003293,5	20903238,4	,0167	38,8242	,0289
7	93,37	1530,17	63149,8	919,0	99960,5
8	2,40	23,213	1850,64	26,72	1488,81
9	45,049	31,8356	60450,1	-18289,8	99960,5
10	109393,3	1931,8	1771,58	535,79	1488,81
11	65,630	238,211	35,789	117,439	117,700
12	877,1	2814,6	7,908	0,000	5875,498
13	338,579	,117	2845,603	315,498	,353
14	27,482	,480	,025	,008	5221,380
15	11661245,1	6263073,0	18387066,5	0,0	62,19
16	58,91	3,28	,04	,01	0,0
GP1	239,8516	52,561	120,93125	33,73861	3508,091
GP2	-56,870843	180,48185	814,6204	43,703	197,12068
GP3	33,91660	157,69064	3440,2305		
GP4	,9945765	9,415	700566,487	179,75399	,0937514
GP5	71,59850	30,23682	3462,541	1904,917	
GP6	859,7370	6,5593907E+06		22,267	147,367
GP7	323,69152				

1	105,000	17.693	11,875	191720,4	132607,0
2	35,8218	160,1500	2538,772	2505,282	26,708
3	39,174	185.733	2,225	8,508	8,786
4	36,255	196.241	120,691	34,565	34,386
5	196,000	36.006	1,40000	0,00000	=1,66889
6	21010755,7	20903267,3	7,0637	39,3322	=8,3547
7	73,17	1141,38	72843,2	1027,5	=107362,4
8	2,51	16.593	2026,64	9,98	=1472,78
9	46,236	31,813	=69738,2	=21066,0	=107362,4
10	119367,5	2058,2	=1945,38	=568,21	=1472,78
11	63,755	231,233	36,388	121,212	111,028
12	17536,0	75576,6	=7,908	,004	6105,580
13	340,161	,284	2942,580	315,781	1,400
14	642,903	,709	=,678	=,157	5449,580
15	11661245,1	6263073,0	19346042,2	0,0	65,49
16	60,71	4,76	=1,25	=,26	0,0
GP1	246,8506	58.809	120,95886	33,63686	3651,796
GP2	-55.486168	180,53311	=813,3037	47,815	196,67214
GP3	33,81459	160,33172	3440,2352		
GP4	.9936854	10.970	648860,160	179,73676	,0980837
GP5	73.72668	30,27188	3463,669	2055,128	
GP6	861,1586	7,0747736E+06		23,387	151,998
GP7	324.22383				

1	110,000	18,904	13,596	191550,1	129279,4
2	33,5081	161,5093	2675,502	2639,847	26,863
3	39,325	174,973	3,403	16,385	16,698
4	33,849	194,738	120,700	34,537	34,359
5	196,000	33.622	1,40000	0,00000	=1,66889
6	21018161,1	20903298,9	14,4217	40,9285	=16,5476
7	57,13	865,31	83408,2	953,6	=114696,9
8	2,61	11.983	2197,74	=46,53	=1461,70
9	47,441	31,7905	=79914,3	=23907,0	=114696,9
10	129978,5	2186,0	=2125,43	=561,05	=1461,70
11	61,670	225.524	37,851	125,454	102,934
12	20999,7	160614,2	=7,911	,005	6341,238
13	341,352	1,714	3033,760	315,984	7,438
14	953,952	,905	=1,442	=,189	5663,770
15	11661245,1	6263073,0	20304228,8	0,0	71,14
16	61,70	9,44	=3,02	=,32	0,0
GP1	254,0472	65,276	120,96880	33,52725	3810,332
GP2	-53.935717	180,59224	=812,1235	52,612	195,45151
GP3	33,70469	161,69549	3440,2404		
GP4	.9925813	12.900	598198,755	179,71600	,1033844
GP5	74.82222	30,31228	3464,830	2227,195	
GP6	862,5661	7,6672998E+06		24,539	156,802
GP7	324.49723				

1	115,800	20,112	15,451	191409,6	125955,4
2	31,3804	161,7043	2828,833	2772,291	25,962
3	39,501	164,183	3,573	23,798	24,009
4	31,922	192,468	120,709	34,507	34,320
5	196,000	31,663	1,40000	0,00000	=1,66889
6	21025534,3	20903333,3	22,4214	43,7411	=24,4617
7	44,79	659,05	94798,1	496,0	=121987,4
8	2,71	3,742	2355,30	=142,89	=1455,25
9	48,701	31,7681	=90989,1	=26606,6	=121987,4
10	141224,5	2311,7	=2303,44	=511,86	=1455,25
11	59,528	220,726	40,266	129,413	94,436
12	17322,2	200715,9	-7,919	,004	6582,770
13	342,246	5,731	3119,953	316,130	22,745
14	1075,456	1,354	=1,802	=,156	5924,095
15	11661245,1	6263073,0	21261588,2	0,0	81,13
16	62,63	18,51	=4,25	=,27	0,0
GP1	261,4282	71,809	120,95839	33,41275	3978,709
GP2	-52,371199	180,65700	=811,0552	57,889	193,60588
GP3	33,58982	161,90642	3440,2460		
GP4	,9913025	15,139	592025,011	179,69288	,1093284
GP5	74,97499	30,35717	3466,024	2411,108	
GP6	863,9468	8,3241503E+06		25,723	161,768
GP7	324,58171				

1	120,000	21,318	17,426	191288,7	122634,0
2	29,5283	160,9939	2990,460	2898,429	24,409
3	39,698	153,362	2,777	30,755	30,838
4	30,388	189,663	120,717	34,475	34,296
5	196,000	30,098	1,40000	0,00000	=1,66889
6	21032899,5	20903370,4	31,4626	48,0262	=31,8985
7	35,14	502,99	106927,5	=532,4	=129257,3
8	2,79	6,433	2492,65	=273,65	=1453,51
9	50,026	31,7458	=102932,1	=28961,4	=129257,3
10	153088,2	2432,7	=2471,52	=424,02	=1453,51
11	57,426	216,560	43,541	132,560	86,234
12	10497,8	214039,7	-7,932	,003	6830,560
13	342,910	12,596	3203,024	316,234	50,807
14	1083,499	1,151	=1,923	=,094	6170,887
15	11661245,1	6263073,0	22218338,1	0,0	94,78
16	63,48	31,31	=4,85	=,17	0,0
GP1	268,9963	78,308	120,92765	33,29641	4151,768
GP2	-50,904607	180,72512	=810,0615	63,453	191,32109
GP3	33,47324	161,22294	3440,2521		
GP4	,9899001	17,598	511816,024	179,66833	,1155952
GP5	74,39247	30,40545	3467,254	2597,771	
GP6	865,2693	9,0288695E+06		26,943	166,894
GP7	324,52553				

END STAGE I YAW PROGRAM

BEGIN EIGHTH PITCH RATE - STAGE I

1	120,000	21.313	17,426	191288,7	122634,0
2	29,2283	160,9939	2990,460	2898,429	24,489
3	39,698	153,362	2,777	30,755	30,838
4	30,338	189,663	120,717	34,475	34,296
5	196,000	30,608	0,00000	-1,22116	0,00000
6	21032899,5	20903370,4	31,4626	48,0262	-31,8985
7	35,14	502,99	106927,5	-532,4	-129257,3
8	2,79	6,433	2492,65	-273,65	-1453,51
9	50,026	31,7458	-102932,1	-28961,4	-129257,3
10	153088,2	2432,7	-2471,52	-424,02	-1453,51
11	57,426	216,560	43,544	132,560	86,234
12	10497,8	214039,7	-7,932	,003	6830,560
13	342,910	12,596	3202,024	316,234	50,807
14	1083,499	1,151	-1,923	-,094	6170,887
15	11661245,1	6263073,0	22218338,1	0,0	94,78
16	63,48	31,31	-4,85	-,17	0,0
QP1	268,9963	76,308	120,92765	33,29641	4151,768
QP2	-50,904607	180,72512	-810,0615	63,453	191,32109
QP3	33,47324	161,22294	3440,2521		
QP4	.9899001	17,598	511816,624	179,66833	,1155952
QP5	74,39247	30,40545	3467,254	2597,771	
QP6	865,2693	9,0288695E+06		26,943	166,894
QP7	324,52553				

1	125,000	22,526	19,510	191160,1	119315,2
2	27,8834	163,0382	3159,746	3028,832	27,766
3	38,629	153,339	4,179	28,950	29,161
4	29,625	186,821	120,723	34,440	34,262
5	196,000	28,701	0,00000	=,22116	0,00000
6	21040277,9	20903410,0	30,8671	46,9082	=32,4707
7	27,75	385,95	1197,3,2	=2266,0	=136527,2
8	2,88	4,769	2623,28	=420,00	=1454,58
9	51,428	31,7235	=115700,3	-30819,2	=136527,2
10	165556,6	2556,9	=2637,43	=319,35	=1454,58
11	55,413	212,843	42,366	134,822	88,198
12	12439,6	155784,2	-7,955	,003	7084,932
13	343,420	19,554	3280,623	316,311	84,884
14	809,223	1,127	-1,399	=,114	6424,465
15	11661245,1	6263073,0	23174458,6	0,0	107,04
16	64,23	42,81	=3,60	=,21	0,0
GP1	276,6776	85,067	120,88577	33,17562	4329,570
GP2	-49,511118	180,79688	=809,1072	69,320	188,98521
GP3	33,35213	160,29959	3440,2586		
GP4	.9883601	20,305	476302,003	179,64238	,1221603
GP5	73,61123	30,45734	3468,512	2788,293	
GP6	866,5958	9,7841410E+06		28,190	172,124
GP7	324,42623				

1	130,000	23,737	21,710	191026,0	115998,9
2	26,3508	159,2890	3340,539	3175,333	30,871
3	37,562	153,317	5,369	27,287	27,670
4	27,660	184,290	120,727	34,403	34,225
5	196,000	27,301	0,00000	=,22116	0,00000
6	21047678,7	20903452,2	30,2545	45,7760	=33,0330
7	22,22	298,61	133176,9	=4735,5	=143804,4
8	2,99	3,558	2763,82	=568,25	=1456,42
9	52,892	31,7011	=129323,2	-32156,5	=143804,4
10	178679,1	2694,4	=2813,38	=215,58	=1456,42
11	53,481	209,477	41,192	136,868	89,942
12	13362,5	114900,2	-7,978	,004	7346,270
13	343,832	24,524	3358,858	316,371	116,382
14	614,774	1,105	=1,032	=,120	6685,199
15	11661245,1	6263073,0	24129921,2	0,0	118,06
16	64,90	53,16	=2,71	=,23	0,0
GP1	284,3959	92,515	120,84104	33,04565	4515,324
GP2	-48,123711	180,87392	=808,4274	75,614	186,86431
GP3	33,22182	159,58325	3440,2686		
GP4	.9866241	23,362	443851,101	179,61459	,1291727
GP5	72,99738	30,51404	3469,783	2988,448	
GP6	868,0192	1,0606985E+07		29,450	177,402
GP7	324,35973				

1	135,000	24.952	24,038	190888,0	112685,2
2	24,9265	158,6929	3532,739	3337,115	33,815
3	36,499	153,296	6,364	25,748	26,336
4	26,320	182,031	120,730	34,363	34,185
5	196,000	25,925	0,00000	-1,22116	0,00000
6	21055107,3	20903497,2	29,6248	44,6294	=33,5849
7	17,99	239,28	147367,1	-7953,4	-151092,6
8	3,10	2,671	2913,78	=719,53	=1458,94
9	54,429	31,6787	-143850,6	-32974,6	-151092,6
10	192524,4	2846,0	=2999,23	=111,49	=1458,94
11	51,614	206,400	40,021	138,730	91,504
12	13383,4	86079,5	=8,001	,004	7615,007
13	344,166	27,979	3427,769	316,418	145,631
14	473,904	1,083	=,773	=,120	6953,475
15	11661245,1	6263073,0	25084708,2	0,0	127,89
16	65,51	62,38	=2,07	=,25	0,0
GP1	291,7360	100,401	120,79270	32,90959	4699,505
GP2	-46,638536	180,95272	-808,2721	82,135	184,93541
GP3	33,08538	159,02008	3440,5102		
GP4	.9846742	26,804	414172,204	179,58485	,1366288
GP5	72,50723	30,57602	3471,069	3198,266	
GP6	869,5529	1,1503469E+07		30,724	182,728
GP7	324,32082				

1	140,000	26,172	26,506	190747,3	109374,0
2	23,0048	158,2071	3736,349	3513,502	36,667
3	35,438	153,281	7,182	24,313	25,128
4	25,025	180,002	120,731	34,321	34,143
5	196,000	24,591	0,00000	=,22116	0,00000
6	21062569,4	20903545,0	28,9779	43,4682	=34,1261
7	14,87	196,03	162329,7	-11937,7	-158394,9
8	3,25	2,015	3072,69	=874,97	=1462,08
9	56,051	31,6562	-159331,8	-33268,9	-158394,9
10	207163,2	3011,9	=3194,84	=5,87	=1462,08
11	49,804	203,572	38,859	140,433	92,913
12	12935,1	65688,2	=8,024	,004	7891,573
13	344,443	30,396	3496,397	316,454	172,963
14	373,717	1,063	=,590	=,116	7229,682
15	11661245,1	6263073,0	26038801,7	0,0	136,61
16	66,07	70,54	=1,62	=,25	0,0
GP1	299,5200	109,149	120,74057	32,76054	4901,876
GP2	-45,274338	181,04052	-807,8955	89,318	183,16180
GP3	32,93591	158,56911	3440,5376		
GP4	.9824905	30,668	386987,143	179,55302	,1445291
GP5	72,10573	30,64379	3472,372	3417,889	
GP6	871,2119	1,2480360E+07		32,013	188,102
GP7	324,30425				

1	145,660	27,396	29,125	190580,6	106065,4
2	22,3790	157,7974	3951,448	3703,956	39,478
3	34,380	153,265	7,841	22,966	24,017
4	23,787	178,167	120,730	34,276	34,099
5	196,000	23,311	0,00000	=,22116	0,00000
6	21070070,4	20903595,9	28,3136	42,2922	=34,6563
7	12,46	162,52	178108,3	-16711,9	-165714,2
8	3,42	1,520	3240,10	-1035,70	=1465,73
9	57,760	31,6336	-175815,1	-33028,7	-165714,2
10	222667,1	3192,1	-3400,06	102,49	=1465,73
11	48,044	200,957	37,709	141,991	94,193
12	12467,6	50495,0	-8,108	,004	8176,394
13	344,683	32,245	3561,783	316,482	198,705
14	299,355	1,044	=,453	-1,112	7514,200
15	11661245,1	6263073,0	26992172,3	0,0	144,25
16	66,59	77,66	-1,27	=,25	0,0
GP1	307,3576	118,599	120,68367	32,60114	5113,357
GP2	-43,928878	181,13433	-807,7062	96,996	181,52287
GP3	32,77607	158,19571	3440,5669		
GP4	.9800511	34,997	362039,452	179,51897	,1528767
GP5	71,76505	30,71794	3473,692	3647,530	
GP6	873,0127	1,3545099E+07		33,319	193,526
GP7	324,30521				

1	150,000	28,631	31,906	190316,5	102760,7
2	21,2419	157,4451	4178,103	3908,185	42,264
3	33,326	153,252	8,356	21,698	22,984
4	22,611	176,500	120,727	34,229	34,051
5	196,000	22,091	0,00000	=,22116	0,00000
6	21077615,5	20903650,0	27,6319	41,1012	=35,1750
7	16,49	137,96	194744,6	-22304,5	-173052,8
8	3,62	1,144	3415,86	-1202,33	=1469,76
9	59,543	31,6109	-193348,5	-32238,4	-173052,8
10	239108,0	3386,7	-3614,94	214,21	=1469,76
11	46,331	198,532	36,574	143,415	95,366
12	11488,2	38786,1	-8,232	,004	8469,767
13	344,898	33,733	3624,053	316,505	223,067
14	241,206	1,026	=,347	=,103	7807,305
15	11661245,1	6263073,0	27944414,0	0,0	150,95
16	67,09	83,86	-1,00	=,24	0,0
GP1	315,2530	128,781	120,62151	32,43090	5334,336
GP2	-42,604452	181,23449	-807,7186	105,199	180,00308
GP3	32,60535	157,88155	3440,5981		
GP4	.9773322	39,837	339102,437	179,48253	,1616748
GP5	71,47009	30,79910	3475,029	3887,406	
GP6	874,9746	1,4705561E+07		34,642	198,998
GP7	324,32124				

1	155,600	29,872	34,864	190051,3	99460,7
2	20,1855	157,1412	4416,730	4126,372	45,076
3	32,275	153,240	8,743	20,507	22,018
4	21,499	174,984	120,723	34,178	34,001
5	196,000	20,930	0,00000	=,22116	0,00000
6	21085209,6	20903707,4	26,9326	39,8950	=35,6819
7	8,91	120,13	212281,4	=28746,0	=180412,3
8	3,85	.857	3600,34	=1375,34	=1474,08
9	61,439	31,5881	=211981,4	=30880,3	=180412,3
10	256559,2	3596,3	=3839,97	329,67	=1474,08
11	44,665	196,274	35,458	144,713	96,451
12	10103,0	29908,9	=8,356	.004	8772,270
13	348,090	34,880	3683,366	316,522	246,135
14	196,275	1,009	=,267	=,090	8109,575
15	11661245,1	6263073,0	28895332,1	0,0	156,82
16	67,57	89,25	=,79	=,23	0,0
QP1	323,2138	139,742	120,55375	32,24906	5565,442
QP2	=41,300931	181,34145	=807,9503	113,967	178,59147
QP3	32,42299	157,61756	3440,6313		
QP4	.9743049	45,244	317950,562	179,44347	,1709393
QP5	71,21333	30,88805	3476,386	4138,055	
QP6	877,1191	1,5971561E+07		35,983	204,523
QP7	324,35144				

1	160,000	31,120	38,000	189785,3	96165,1
2	19,2030	156,8768	4667,868	4358,830	47,942
3	31,227	153,231	9,015	19,386	21,107
4	20,448	173,601	120,716	34,125	33,948
5	196,000	19,830	0,00000	=,22116	0,00000
6	21092857,5	20903768,2	26,2159	38,6736	=36,1766
7	7,53	103,65	230763,2	=36060,8	=187794,0
8	4,11	.638	3793,94	=1555,33	=1478,62
9	63,461	31,5652	=231766,0	=28934,5	=187794,0
10	275096,4	3821,2	=4075,68	449,33	=1478,62
11	43,044	194,168	34,364	145,888	97,463
12	8618,5	23056,4	=8,479	.004	9084,612
13	343,262	35,744	3739,867	316,536	268,002
14	158,960	.993	=,205	=,077	8421,714
15	11661245,1	6263073,0	29844923,2	0,0	161,94
16	68,02	93,91	=,63	=,20	0,0
QP1	331,2505	151,536	120,47995	32,05474	5807,402
QP2	=40,017805	181,45574	=808,4219	123,349	177,27689
QP3	32,22811	157,39520	3440,6666		
QP4	.9709357	51,285	298384,947	179,40153	,1806918
QP5	70,98766	30,98570	3477,764	4400,126	
QP6	879,4696	1,7354368E+07		37,344	210,101
QP7	324,39491				

1	165,000	32,373	41,335	189518,7	92874,2
2	18,2883	156,6448	4932,089	4605,921	50,884
3	30,183	153,223	9,185	18,333	20,239
4	19,459	172,335	120,708	34,068	33,891
5	196,000	18,787	0,00000	=,22116	0,00000
6	21100564,6	20903832,7	25,4818	37,4370	=36,6587
7	6,32	88,33	250236,6	-44312,3	-195198,8
8	4,38	,471	3997,05	-1742,92	-1483,33
9	65,623	31,5421	-252757,0	-26378,9	-195198,8
10	294797,1	4061,8	-4322,63	573,67	-1483,33
11	41,467	192,198	33,295	146,944	98,419
12	7235,7	17763,3	-8,603	,003	9407,498
13	345,414	36,381	3793,696	316,547	288,759
14	127,992	,977	=,158	=,064	8744,424
15	11661245,1	6263073,0	30793184,0	0,0	166,39
16	68,46	97,93	=,49	=,18	0,0
GP1	339,3751	164,223	120,39964	31,84699	6060,957
GP2	-38,754873	181,57796	-809,1565	133,399	176,04950
GP3	32,61975	157,20744	3440,7048		
GP4	,9671879	58,031	280237,539	179,35639	,1909546
GP5	70,78721	31,09306	3479,164	4674,275	
GP6	882,8521	1,88663835+07		38,726	215,740
GP7	324,45093				

1	173,000	33,646	44,879	189251,6	89587,8
2	17,4361	156,4392	5209,985	4868,051	53,927
3	29,143	153,216	9,262	17,341	19,405
4	18,530	171,174	120,697	34,007	33,831
5	196,000	17,800	0,00000	=,22116	0,00000
6	21108336,1	20903901,0	24,7302	36,1850	=37,1279
7	5,36	75,28	270250,2	-53512,9	-202627,4
8	4,68	,345	4210,07	-1938,72	-1488,15
9	67,940	31,5188	-275011,9	-23189,0	-202627,4
10	315741,2	4318,6	-4581,36	703,16	-1488,15
11	39,936	190,353	32,252	147,881	99,334
12	5940,8	13536,5	-8,869	,003	9741,636
13	345,550	36,850	3844,997	316,554	388,499
14	102,902	,962	=,120	=,052	9078,409
15	11661245,1	6263073,0	31740111,3	0,0	170,26
16	68,86	101,39	=,39	=,15	0,0
GP1	347,6010	177,871	120,31230	31,62477	6326,859
GP2	-37,512186	181,70873	-810,1802	144,177	174,90059
GP3	31,79686	157,04854	3440,7448		
GP4	,9630214	65,566	263365,169	179,30769	,2017510
GP5	70,60714	31,21128	3480,590	4961,163	
GP6	884,8953	2,0521215E+07		40,132	221,443
GP7	324,51900				

1	175,000	34,925	48,643	128984,1	86306,0
2	16,6417	156,2551	5502,160	5145,666	57,093
3	28,107	153,212	9,255	16,406	18,599
4	17,658	170,104	120,684	33,943	33,767
5	196,000	16,867	0,00000	-1,22116	0,00000
6	21116177,8	20903973,3	23,9612	34,9176	=37,5838
7	4,45	64,36	292354,4	-63714,2	=210080,4
8	5,84	.250	4433,39	-2143,32	=1493,02
9	70,427	31,4953	=298891,2	-19337,8	=210080,4
10	338019,7	4592,0	=4852,43	838,28	=1493,02
11	38,449	188,620	31,239	148,700	100,222
12	4809,6	10267,2	-9,152	.002	10087,733
13	345,670	37,206	3893,911	316,566	327,315
14	82,814	.948	=,090	-.042	9424,372
15	11661245,1	6263073,0	32685701,6	0,0	173,62
16	69,25	104,37	=,30	=,13	0,0
GP1	355,9434	192,552	120,21736	31,38692	6605,870
GP2	-36,289989	181,84877	=811,5225	155,750	173,82246
GP3	31,55829	156,91378	3440,7873		
GP4	.9583921	73,979	247644,869	179,25302	,2131047
GP5	70,44343	31,34162	3482,042	5261,455	
GP6	888,0313	2,233377E+07		41,565	227,217
GP7	324,59884				

1	180,000	36,215	52,640	188746,8	83028,5
2	15,9011	156,0888	5809,230	5439,247	60,420
3	27,074	153,209	9,173	15,524	17,812
4	16,842	169,116	120,670	33,876	33,700
5	196,000	15,983	0,00000	-1,22116	0,00000
6	21124095,6	20904049,7	23,1748	33,6348	=38,0259
7	3,69	53,80	315101,9	-74961,8	=217557,6
8	5,44	.178	4667,43	-2357,30	=1497,90
9	73,120	31,4717	=323557,7	-14796,0	=217557,6
10	361689,6	4882,5	=5136,38	979,46	=1497,90
11	37,007	186,992	30,256	149,399	101,096
12	3795,2	7496,3	-9,435	.002	10446,489
13	348,777	37,482	3940,586	316,565	345,278
14	65,688	.934	=,065	-.033	9783,011
15	11661245,1	6263073,0	33630013,5	0,0	176,57
16	69,62	106,95	=,23	=,11	0,0
GP1	364,4205	208,349	120,11425	31,13214	6898,751
GP2	-35,088789	181,99885	=813,2161	168,192	172,80869
GP3	31,34273	156,79979	3440,8330		
GP4	.9532518	83,373	232970,726	179,19792	,2250400
GP5	70,29312	31,48552	3483,525	5575,805	
GP6	801,4947	2,4320335E+07		43,025	233,071
GP7	324,69043				

1	185,000	37,519	56,884	188517,0	79754,9
2	15,2102	155,9385	6132,212	5749,707	63,929
3	26,047	153,209	9,023	14,692	17,042
4	16,077	168,203	120,652	33,804	33,629
5	196,000	15,151	0,00000	=,22116	0,00000
6	21132096,1	20904130,4	22,3711	32,3365	=38,4540
7	3,31	44,48	339047,9	=87304,1	=225059,3
8	5,87	.125	4912,97	=2581,39	=1502,76
9	76,032	31,4478	=349978,0	=9532,1	=225059,3
10	386865,0	5190,8	=5434,18	1127,19	=1502,76
11	35,610	185,459	29,305	149,978	101,969
12	2917,4	5238,7	=9,718	.002	10819,016
13	345,870	37,711	3985,157	316,568	362,400
14	51,261	.921	=,045	=,025	10155,437
15	11661245,1	6263073,0	34573172,6	0,0	179,14
16	69,96	109,18	=,17	=,09	0,0
GP1	373,0557	225,371	120,00226	30,85876	7206,603
GP2	-33,907346	182,16000	=815,3020	181,602	171,85348
GP3	31,02849	156,70480	3440,8817		
GP4	.9475413	93,873	219234,497	179,13576	,2375968
GP5	70,15457	31,64476	3485,042	5905,265	
GP6	895,3280	2,6501058E+07		44,519	239,013
GP7	324.79425				

1	190,000	38,836	61,389	188286,9	76485,1
2	14,5644	155,8019	6472,491	6078,319	67,649
3	25,023	153,210	8,813	13,907	16,285
4	15,361	167,355	120,633	33,729	33,553
5	196,000	14,361	0,00000	=,22116	0,00000
6	21140186,6	20904215,7	21,5506	31,0231	=38,8675
7	2,41	36,42	364252,4	=100794,5	=232585,1
8	6,34	.006	5171,06	=2816,62	=1507,57
9	79,189	31,4237	=377924,6	=3511,7	=232585,1
10	413628,9	5518,0	=5747,11	1282,17	=1507,57
11	34,258	184,013	28,388	150,433	102,854
12	2180,0	3715,5	=10,050	.001	11206,793
13	345,949	37,871	4027,739	316,571	378,699
14	39,282	.908	=,032	=,019	10543,128
15	11661245,1	6263073,0	35515182,2	0,0	181,36
16	70,27	111,08	=,13	=,07	0,0
GP1	381,8750	243,749	119,88051	30,56471	7530,849
GP2	-32,743231	182,33350	=817,8319	196,104	170,95079
GP3	30,73349	156,62706	3440,9339		
GP4	.9411878	105,633	206332,581	179,06778	,2508292
GP5	70,02603	31,82153	3486,597	6251,261	
GP6	899,5850	2,8900544E+07		46,048	245,061
GP7	324.91088				

1	195,000	40,169	66,169	188056,8	73219,1
2	13,9599	155,6774	6831,471	6426,398	71,615
3	24,005	153,213	8,548	13,165	15,538
4	14,689	166,566	120,611	33,649	33,474
5	196,000	13,610	0,00000	=,22116	0,00000
6	21148374,9	20904305,7	20,7133	29,6946	=39,2662
7	1,90	29,41	390781,0	=115491,1	=240134,6
8	6,87	.058	5442,75	=3064,02	=1512,24
9	82,623	31,3993	=407476,5	3303,3	=240134,6
10	442078,8	5865,4	=6076,46	1445,10	=1512,24
11	32,950	182,648	27,504	150,763	103,762
12	1568,9	2975,4	=10,615	.001	11611,307
13	346,017	37,984	4068,444	316,573	394,192
14	29,492	.896	=,022	=,013	10947,569
15	11661245,1	6263073,0	36456041,6	0,0	183,25
16	70,56	112,69	=,10	=,05	0,0
QP1	390,9091	263,633	119,74804	30,24764	7872,946
QP2	-31,594864	182,52077	=820,8651	211,836	170,09560
QP3	30,41539	156,56519	3440,9898		
QP4	.9341100	118,834	194180,587	178,99309	,2647920
QP5	69,90607	32,01836	3488,194	6615,221	
QP6	904,3273	3,1546286E+07		47,619	251,223
QP7	325.04112				

1	200,000	41,518	71,241	187826,5	69957,0
2	13,3939	155,5635	7210,569	6795,284	75,868
3	22,992	153,217	8,236	12,462	14,798
4	14,060	165,830	120,586	33,564	33,390
5	196,000	12,897	0,00000	=,22116	0,00000
6	21156669,9	20904400,7	19,8596	28,3513	=39,6496
7	1,46	23,25	418704,2	=131457,1	=247707,1
8	7,44	.038	5729,08	=3324,61	=1516,74
9	86,373	31,3747	=438718,8	10954,2	=247707,1
10	472318,5	6234,1	=6423,53	1616,68	=1516,74
11	31,685	181,356	26,655	150,967	104,703
12	1117,9	1754,9	=11,179	.001	12034,041
13	346,674	38,860	4107,386	316,574	408,899
14	21,637	.884	=,015	=,009	11370,243
15	11661245,1	6263073,0	37395750,2	0,0	184,83
16	70,82	114,02	=,07	=,04	0,0
QP1	400,1946	285,195	119,60373	29,90488	8234,380
QP2	-30,461377	182,72346	=824,4697	228,961	169,28373
QP3	30,07149	156,51819	3441,0499		
QP4	.9262174	133,676	182709,176	178,91064	,2795409
QP5	69,79348	32,23816	3489,840	6998,566	
QP6	909,6250	3,4468906E+07		49,236	257,520
QP7	325.18600				

1	205,990	42,886	76,622	187596,2	66698,7
2	12,8641	155,4591	7611,211	7186,337	80,457
3	21,984	153,224	7,878	11,797	14,065
4	13,470	165,143	120,558	33,475	33,301
5	196,000	12,219	0,00000	=,22116	0,00000
6	21165081,1	20904500,9	18,9898	26,9933	=40,0174
7	1,10	18,02	448097,9	-148761,1	=255301,5
8	8,08	.024	6031,10	-3599,42	=1520,99
9	90,484	31,3497	-471743,4	19485,9	=255301,5
10	504457,9	6625,5	-6789,60	1797,59	=1520,99
11	30,462	180,133	25,842	151,041	105,687
12	771,7	1174,5	-11,743	.001	12476,480
13	346,121	38,110	4144,678	316,575	422,837
14	15,462	.873	=,010	=,006	11812,634
15	11661245,1	6263073,0	38334307,4	0,0	186,14
16	71,04	115,10	=,05	=,03	0,0
GP1	409,7745	308,633	119,44637	29,53333	8616,657
GP2	-29,342470	182,94340	-828,7240	247,663	168,51164
GP3	29,69868	156,48533	3441,1145		
GP4	.9174096	150,394	171860,645	178,81918	,2951317
GP5	69,68730	32,48428	3491,541	7402,714	
GP6	915,5582	3,7702434E+07		50,906	263,970
GP7	325,34681				

1	210,000	44,274	82,329	187288,1	63444,5
2	12,3687	155,3633	8034,727	7600,836	85,400
3	20,981	153,233	7,480	11,167	13,338
4	12,919	164,500	120,528	33,381	33,207
5	196,000	11,574	0,00000	=,22116	0,00000
6	21173619,2	20904606,7	18,1040	25,6209	=40,3692
7	.78	13,18	479043,0	-167476,8	=262916,5
8	8,60	.015	6349,79	-3889,41	=1524,93
9	94,971	31,3244	-506648,6	28946,9	=262916,5
10	538613,4	7040,7	-7175,87	1988,50	=1524,93
11	29,280	178,973	25,064	150,983	106,724
12	493,2	734,5	-12,306	.000	12940,003
13	346,158	38,144	4180,433	316,575	436,023
14	10,344	.862	=,006	=,004	12276,118
15	11661245,1	6263073,0	39271634,9	0,0	187,20
16	71,23	115,96	=,03	=,02	0,0
GP1	419,6993	334,172	119,27457	29,12950	9021,208
GP2	-28,238589	183,18267	-833,7162	268,155	167,77648
GP3	29,29343	156,46615	3441,1842		
GP4	.9075778	169,251	161588,629	178,71725	,3116168
GP5	69,58673	32,76055	3493,305	7828,969	
GP6	922,2176	4,1283775E+07		52,636	270,599
GP7	325,52510				

1	215,000	45,684	88,382	186863,5	60196,8
2	11,9057	155,2756	8482,330	8039,953	90,732
3	19,985	153,243	7,045	10,571	12,617
4	12,404	163,900	120,494	33,281	33,107
5	196,000	10,958	0,00000	=,22116	0,00000
6	21182295,6	20904718,2	17,2028	24,2343	=40,7045
7	,54	9,43	511624,8	=187681,9	=270549,9
8	9,10	,009	6686,05	=4195,43	=1528,37
9	99,870	31,2987	=543537,5	39388,5	=270549,9
10	574906,6	7481,0	=7583,46	2189,98	=1528,37
11	28,139	177,871	24,322	150,791	107,822
12	304,4	444,8	=13,106	,000	13425,865
13	346,187	38,168	4214,782	316,576	448,455
14	6,767	,852	=,004	=,002	12761,950
15	11661245,1	6263073,0	40207013,8	0,0	188,03
16	71,39	116,64	=,02	=,01	0,0
GP1	430,0230	362,063	119,08685	28,68944	9449,363
GP2	-27,150438	183,44359	=839,5475	290,674	167,07612
GP3	28,85180	156,46859	3441,2595		
GP4	.8966045	190,541	151854,795	178,60322	,3290439
GP5	69,49129	33,07132	3495,140	8278,532	
GP6	929,7088	4,5252632E+07		54,434	277,431
GP7	325.72273				

1	220,000	47,117	94,802	186438,7	56956,0
2	11,4710	155,1950	8957,359	8506,954	96,589
3	18,994	153,256	6,578	10,005	11,902
4	11,921	163,336	120,457	33,176	33,003
5	196,000	10,369	0,00000	=,22116	0,00000
6	21191122,5	20904835,9	16,2866	22,8340	=41,0231
7	,37	6,73	545936,9	=209462,0	=278198,9
8	9,62	,006	7042,38	=4519,81	=1531,14
9	105,314	31,2726	=582523,8	50867,2	=278198,9
10	613469,6	7949,2	=8015,40	2403,58	=1531,14
11	27,037	176,824	23,618	150,463	108,988
12	181,4	262,1	=14,216	,000	13937,492
13	346,209	33,184	4247,710	316,576	460,143
14	4,384	,842	=,002	=,001	13273,553
15	11661245,1	6263073,0	41140269,3	0,0	188,66
16	71,52	117,15	=,01	=,01	0,0
GP1	440,8248	392,697	118,88080	28,20705	9904,367
GP2	-26,072737	183,72993	=846,3734	315,601	166,40604
GP3	28,36765	156,46864	3441,3411		
GP4	.8843041	214,719	142585,497	178,47454	,3475435
GP5	69,49022	33,42316	3497,058	8754,725	
GP6	938,1915	4,9671616E+07		56,312	284,503
GP7	325.94236				

1	225,000	48,576	101,612	186014,0	53722,2
2	11,0617	155,1209	9463,542	9005,512	103,070
3	18,010	153,271	6,084	9,467	11,194
4	11,466	162,804	120,417	33,065	32,892
5	196,000	9,802	0,00000	=,22116	0,00000
6	21200113,9	20904960,0	15,3560	21,4206	=41,3246
7	,25	4,71	582086,7	=232915,4	=285859,8
8	10,19	.003	7421,56	=4865,12	=1533,08
9	111,400	31,2460	=623737,8	63447,8	=285859,8
10	654450,6	8448,7	=8475,07	2631,00	=1533,08
11	25,972	175,826	22,951	149,999	110,229
12	107,3	155,8	=15,325	.000	14478,686
13	346,225	38,192	4279,383	316,576	471,104
14	2,811	.832	=,001	=,001	13814,730
15	11661245,1	6263073,0	42071401,2	0,0	189,14
16	71,62	117,52	=,01	=,00	0,0
GP1	452,2077	426,562	118,65342	27,67471	10389,872
GP2	-25,001030	184,04636	=854,3855	343,409	165,76241
GP3	27,63331	156,49064	3441,4302		
GP4	.8704552	242,340	133719,798	178,32797	,3672612
GP5	69,31289	33,82425	3499,072	9261,224	
GP6	947,8617	5,4615525E+07		58,282	291,866
GP7	326,18748				

1	230,000	50,064	108,238	185589,3	50495,4
2	10,6761	155,0529	10004,628	9539,332	110,295
3	17,034	153,288	5,566	8,953	10,495
4	11,039	162,302	120,373	32,948	32,775
5	196,000	9,254	0,00000	=,22116	0,00000
6	21209285,3	20905091,0	14,4116	19,9944	=41,6086
7	,16	3,08	620195,1	=258152,9	=293527,9
8	10,56	.002	7826,34	=5233,93	=1534,02
9	118,250	31,2189	=667326,4	77203,6	=293527,9
10	698015,1	8983,2	=8965,83	2873,95	=1534,02
11	24,943	174,875	22,322	149,399	111,549
12	61,5	90,9	=16,430	.000	15053,250
13	346,237	38,196	4309,844	316,576	481,354
14	1,724	.823	=,001	=,000	14389,283
15	11661245,1	6263073,0	43000409,6	0,0	189,49
16	71,70	117,79	=,01	=,00	0,0
GP1	464,3030	464,255	118,40118	27,08307	10909,603
GP2	-23,932576	184,39847	=863,8136	374,682	165,14240
GP3	27,23938	156,52729	3441,5279		
GP4	.8548061	274,073	125213,341	178,15943	,3883436
GP5	69,22884	34,28450	3501,202	9801,677	
GP6	958,9533	6,0169619E+07		60,364	299,582
GP7	326,46250				

1	235,000	51,583	116,511	185164,6	47275,6
2	10,3132	154,9905	10584,376	10112,144	118,418
3	16,065	153,307	9,027	8,462	9,806
4	10,637	151,827	120,326	32,823	32,651
5	196,000	8,724	0,00000	-,22116	0,00000
6	21218654,3	20905229,3	13,4540	18,5561	=41,8749
7	,11	2,34	660397,3	-285298,5	-301197,9
8	18,95	.001	8259,50	-5628,82	=1533,82
9	126,015	31,1913	-713453,5	92216,4	-301197,9
10	744347,1	9556,3	-9491,05	3134,14	=1533,82
11	23,948	173,965	21,730	148,662	112,953
12	35,4	53,9	-17,534	,000	15664,988
13	346,245	38,198	4339,168	316,576	490,910
14	1,069	.814	-,000	-,000	15001,013
15	11661245,1	6263073,0	43927294,3	0,0	189,75
16	71,77	117,98	-,00	-,00	0,0
QP1	477,2789	506,518	118,11979	26,42050	11467,339
QP2	-22,866011	184,79315	-874,9339	410,148	164,54400
QP3	26,57417	156,57961	3441,6356		
QP4	.8370710	310,721	117034,065	177,96365	,4109380
QP5	69,14775	34,81599	3503,472	10379,698	
QP6	971,7468	6,6430891E+07		62,580	307,733
QP7	326.77309				

1	240,000	53,137	124,661	184739,8	44062,8
2	9,9727	154,9338	11206,558	10727,700	127,636
3	15,104	153,329	4,468	7,993	9,129
4	10,260	161,378	120,274	32,692	32,520
5	196,000	8,212	0,00000	-,22116	0,00000
6	21228241,5	20905375,4	12,4838	17,1061	=42,1231
7	,07	1,37	702841,9	-314489,0	-308863,8
8	11,37	.001	8723,80	-6052,35	=1532,31
9	134,893	31,1631	-762299,9	108576,8	-308863,8
10	793648,7	10171,7	-10054,10	3413,29	=1532,31
11	22,984	173,095	21,177	147,791	114,444
12	19,5	30,3	-19,607	,000	16317,704
13	346,251	38,199	4367,427	316,576	499,787
14	,669	.805	-,000	-,000	15653,722
15	11661245,1	6263073,0	44852055,3	0,0	189,94
16	71,82	118,12	-,00	-,00	0,0
QP1	491,3545	554,289	117,80395	25,67228	12066,910
QP2	-21,801027	185,23894	-888,0806	450,731	163,96575
QP3	25,82286	156,64897	3441,7549		
QP4	.8169264	353,256	109158,816	177,73380	,4351925
QP5	69,06939	35,43361	3505,912	10998,847	
QP6	986,5812	7,3509461E+07		64,960	316,427
QP7	327.12656				

1	240,000	53.137	124,061	184739,8	44062,8
2	9,9727	154,9338	11206,558	10727,700	127,636
3	15,104	153.329	4,468	7,993	9,129
4	10,250	161.378	120,274	32,692	32,520
5	196,000	8.212	0,00000	-22116	0,00000
6	21228241,5	20905375,4	12,4838	17,1061	=42,1231
7	1,37	1.37	702841,9	-314489,0	-308863,8
8	11,37	.001	8723,80	-6052,35	=1532,31
9	134,893	31,1631	=762299,9	108576,8	-308863,8
10	793648,7	10171,7	=10054,10	3413,29	=1532,31
11	22,984	173.095	21,177	147,791	114,444
12	19,5	30,3	-19,607	.000	16317,704
13	346,251	38,199	4367,427	316,576	499,787
14	1,669	.805	=,000	-0,000	15653,722
15	11661245,1	6263073,0	44852055,3	0,0	189,94
16	71,82	118,12	=,00	-0,00	0,0
GP1	401,3545	554.289	117,80395	25,67228	12066,910
GP2	-21.801027	185,23894	=888,0806	450,731	163,96575
GP3	25,82286	156,64897	3441,7549		
GP4	.8169264	353.256	109158,816	177,73380	,4351925
GP5	69,06939	35,43361	3505,912	10998,847	
GP6	986,5812	7,3509461E+07		64,960	316,427
GP7	327.12656				

1	245,000	54.729	133,326	184038,7	40858,9
2	9,0531	154,8824	11876,323	11391,119	137,985
3	14,151	153.353	3,891	7,544	8,468
4	9,936	160,953	120,218	32,552	32,381
5	196,000	7.715	0,00000	-22116	0,00000
6	21238069,8	20905529,9	11,5017	15,6451	=42,3529
7	1,05	.92	747693,3	-345875,5	-316518,3
8	11,75	.001	9223,05	-6508,05	=1529,14
9	144,919	31,1342	=814065,1	126384,7	-316518,3
10	846143,2	10834,5	=10659,62	3713,73	=1529,14
11	22,050	172,261	20,663	146,787	116,022
12	10,4	16,6	-21,984	.000	17016,598
13	346,255	38,200	4394,689	316,576	568,005
14	1,416	.797	=,000	-0,000	16352,612
15	11661245,1	6263073,0	45774001,5	0,0	190,09
16	71,86	118,23	=,00	-0,00	0,0
GP1	506,8227	608,849	117,44649	24,81830	12713,460
GP2	-20.735028	185,74760	=903,7006	497,702	163,40571
GP3	24,96524	156,73714	3441,8881		
GP4	.7939576	402,971	101555,614	177,46051	,4613088
GP5	68,99350	36,15728	3508,564	11664,025	
GP6	1003,9133	8,1546381E+07		67,544	325,805
GP7	327.53282				

1	250,000	56,364	142,544	183274,1	37666,1
2	9,3520	154,8361	12601,509	12110,200	149,921
3	13,208	153,380	3,301	7,114	7,828
4	9,574	160,550	120,157	32,405	32,234
5	196,000	7,229	0,00000	-1,22116	0,00000
6	21248165,3	20905693,2	10,5084	14,1738	-42,5640
7	,03	,62	795140,3	-379632,1	-324151,7
8	12,07	,000	9763,04	-7001,29	-1523,83
9	156,551	31,1046	-868978,17	145755,4	-324151,7
10	902085,6	11552,2	-11314,66	4039,01	-1523,83
11	21,145	171,461	20,188	145,654	117,688
12	5,5	9,1	-24,352	,000	17769,585
13	346,258	38,201	4421,008	316,576	515,600
14	,261	,789	,000	,000	17105,596
15	11661245,1	6263073,0	46692378,5	0,0	190,21
16	71,89	118,32	,00	,00	0,0
GP1	524,1082	672,062	117,03698	23,82924	13414,699
GP2	-19,661785	186,33636	-922,4293	552,924	162,86093
GP3	23,97180	156,84658	3442,0382		
GP4	.7675907	461,703	94176,904	177,12998	,4895933
GP5	68,91970	37,01549	3511,485	12382,722	
GP6	1024,3919	9,0736783E+07		70,387	336,073
GP7	328,00623				

1	255,000	58,046	152,365	182414,3	34486,5
2	9,0677	154,7947	13390,851	12893,648	163,837
3	12,276	153,410	2,699	6,699	7,213
4	9,260	160,165	120,091	32,248	32,077
5	196,000	6,752	0,00000	-1,22116	0,00000
6	21258557,8	20905866,3	9,5049	12,6930	-42,7562
7	,92	,43	845402,1	-415960,7	-331752,1
8	12,44	,000	10350,21	-7538,01	-1515,86
9	170,182	31,0742	-927307,0	166822,7	-331752,1
10	961770,3	12333,1	-12027,01	4393,10	-1515,86
11	20,266	170,691	19,753	144,396	119,441
12	2,9	4,9	-26,710	,000	18585,464
13	346,261	38,201	4446,438	316,576	522,609
14	,166	,781	,000	,000	17921,473
15	11661245,1	6263073,0	47606599,5	0,0	190,30
16	71,92	118,38	,00	,00	0,0
GP1	543,8269	746,562	116,56106	22,66367	14179,276
GP2	-18,576157	187,02921	-945,0992	619,036	162,32911
GP3	22,80083	156,98052	3442,2091		
GP4	.7371285	531,872	86985,585	176,72230	,5203880
GP5	68,84768	38,04653	3514,758	13163,122	
GP6	1048,8654	1,0131907E+08		73,569	347,530
GP7	328,56743				

1	260,000	59,781	162,843	181247,8	31322,2
2	8,7990	154,7579	14255,331	13752,416	180,097
3	11,354	153,443	2,090	6,299	6,631
4	8,964	150,709	120,019	32,081	31,911
5	196,000	6,281	0,00000	-22116	0,00000
6	21269282,0	20906049,8	8,4920	11,2034	-42,9291
7	.02	.30	898734,4	-455097,1	-339304,9
8	12,78	.000	10992,63	-8125,71	-1504,62
9	186,177	31,0428	-989360,7	189742,7	-339304,9
10	1025540,3	13188,1	-12806,54	4780,95	-1504,62
11	19,410	169,948	19,356	143,019	121,276
12	1,5	2,5	-29,194	.000	19475,287
13	346,262	38,201	4471,028	316,576	529,086
14	.106	.773	.000	.000	18811,294
15	11661245,1	6263073,0	48515983,8	0,0	190,37
16	71,94	118,43	.00	.00	0,0
QP1	566,9192	836,298	115,99762	21,25933	15018,060
QP2	-17,471875	187,86186	-972,8610	700,013	161,80793
QP3	21,38970	157,14319	3442,4062		
QP4	.7016699	616,851	79943,352	176,20703	,5541226
QP5	68,77715	39,30471	3518,507	14015,356	
QP6	1078,5061	1,1360272E+08		77,210	360,635
QP7	329,24771				

1	264,000	61,211	171,741	180025,9	28805,8
2	8,5940	154,7318	15009,724	14502,354	195,192
3	10,625	153,471	1,599	5,988	6,195
4	8,738	159,517	119,958	31,939	31,770
5	196,000	5,907	0,00000	-22116	0,00000
6	21278127,1	20905204,9	7,6755	10,0060	-43,0535
7	.01	.22	943810,4	-488611,9	-345300,3
8	12,85	.000	11552,77	-8638,52	-1492,59
9	201,076	31,0170	-1041928,5	209534,5	-345300,3
10	1079764,5	13933,9	-13486,33	5119,51	-1492,59
11	18,741	169,373	19,067	141,838	122,801
12	.8	1,3	-31,908	.000	20249,150
13	346,263	38,201	4490,124	316,576	533,922
14	.074	.767	.000	.000	19585,156
15	11661245,1	6263073,0	49238606,9	0,0	190,41
16	71,96	118,46	.00	.00	0,0
QP1	588,7660	923,043	115,46299	19,90103	15751,159
QP2	-16,570263	188,66447	-999,7884	779,523	161,39739
QP3	20,08453	157,29743	3442,5870		
QP4	.6689478	698,619	74393,691	175,68619	,5835681
QP5	68,72163	40,52615	3521,976	14756,721	
QP6	1107,0144	1,2491651E+08		80,575	372,770
QP7	329,90950				

1	264,000	61.211	171,741	180025,9	28805,8
2	8,5940	154,7318	15009,724	14502,354	195,192
3	10,625	153.471	1,599	5,988	6,195
4	8,738	159,517	119,958	31,939	31,770
5	196,000	5.907	0,00000	=,22116	0,00000
6	21278127,1	20906204,9	7,6755	10,0060	=43,0535
7	,91	,22	943810,4	-488641,9	=345300,3
8	12,85	.000	11592,77	=8638,52	=1492,59
9	201,076	31,0170	-1041928,5	209534,5	=345300,3
10	1079704,5	13933,9	-13486,33	5119,51	=1492,59
11	18,741	169.373	19,067	141,838	122,801
12	,8	1,3	-31,908	,000	20249,150
13	346,263	38,291	4490,124	316,576	533,922
14	,074	.767	=,000	=,000	19585,156
15	11661245,1	6263073,0	49238606,9	0,0	190,41
16	71,96	118,46	=,00	=,00	0,0
GP1	588,7660	923,043	115,46299	19,90103	15751,159
GP2	-16,579263	188,66447	-999,7884	779,523	161,39739
GP3	20,02453	157,29743	3442,5870		
GP4	.6689478	698.619	74393,691	175,68619	,5835681
GP5	68.72163	40,52615	3521,976	14756,721	
GP6	1107,0144	1,2491651E+08		80,575	372,770
GP7	329.90950				

1	265,000	61.575	174,042	179588,1	28179,3
2	8,5440	154,7258	15208,010	14699,541	199,210
3	10,444	153.479	1,476	5,911	6,090
4	8,683	159,448	119,942	31,903	31,734
5	196,000	5.814	0,00000	=,22116	0,00000
6	21280378,3	20906244,8	7,4705	9,7059	=43,0827
7	,91	,21	955436,5	-497317,6	=346791,2
8	12,88	.000	11699,93	-8773,31	=1489,07
9	205,047	31,0104	-1055503,8	214698,4	=346791,2
10	1093796,1	14129,9	-13664,94	5208,51	=1489,07
11	18,576	169.231	18,998	141,532	123,189
12	,7	1,2	-31,908	,000	20452,197
13	346,264	38,201	4494,821	316,576	535,088
14	,068	.766	=,000	=,000	19788,203
15	11661245,1	6263073,0	49418414,0	0,0	190,42
16	71,96	118,46	=,00	=,00	0,0
GP1	594,8335	947,365	115,31482	19,52002	15944,014
GP2	-16,341867	188,88905	-1007,3077	802,011	161,29556
GP3	19,64154	157,33971	3442,6359		
GP4	.6600737	721.375	73015,998	175,53646	,5913086
GP5	68.70787	40,86807	3522,926	14951,179	
GP6	1114,9429	1,2798237E+08		81,497	376,099
GP7	330.09578				

1	269,000	63,058	183,570	177352,9	25688,7
2	8,3487	154,7035	16043,010	15530,202	216,470
3	9,726	153,510	,983	5,610	5,694
4	3,469	159,179	119,875	31,752	31,583
5	196,000	5,441	0,00000	-,22116	0,00000
6	21289553,8	20906409,9	6,6479	8,5028	43,1914
7	,01	,16	1003458,3	-533530,5	-352715,8
8	13,03	,000	12319,36	-9340,90	1472,50
9	222,127	30,9836	-1111646,9	236271,8	-352715,8
10	1151943,2	14954,9	-14416,83	5583,37	-1472,50
11	17,922	168,674	18,740	140,269	124,772
12	,4	,9	-31,908	,000	21305,840
13	346,265	38,201	4513,308	316,576	539,591
14	,048	,760	,000	-,000	20641,845
15	11661245,1	6263073,0	5013252,3	0,0	190,46
16	71,98	118,49	-,00	-,00	0,0
GP1	622,1965	1057,955	114,65026	17,78651	16756,888
GP2	-15,415194	189,90763	-1041,1028	905,205	160,89163
GP3	17,39876	157,52479	3442,8485		
GP4	.6214650	823,421	67542,585	174,83743	,6239091
GP5	68,65327	42,41246	3527,145	15767,985	
GP6	1150,4483	1,4131476E+08		85,586	390,925
GP7	330,94664				

1	262,000	63,058	183,570	177352,9	25688,7
2	8,3487	154,7035	16043,010	15530,202	216,470
3	9,726	153,510	,983	5,610	5,694
4	3,469	159,179	119,875	31,752	31,583
5	196,000	5,441	0,00000	-,22116	0,00000
6	21289553,8	20906409,9	6,6479	8,5028	43,1914
7	,01	,16	1003458,3	-533530,5	-352715,8
8	13,03	,000	12319,36	-9340,90	1472,50
9	222,127	30,9836	-1111646,9	236271,8	-352715,8
10	1151943,2	14954,9	-14416,83	5583,37	-1472,50
11	17,922	168,674	18,740	140,269	124,772
12	,4	,9	-31,908	,000	21305,840
13	346,265	38,201	4513,308	316,576	539,591
14	,048	,760	,000	-,000	20641,845
15	11661245,1	6263073,0	5013252,3	0,0	190,46
16	71,98	118,49	-,00	-,00	0,0
GP1	622,1965	1057,955	114,65026	17,78651	16756,888
GP2	-15,415194	189,90763	-1041,1028	905,205	160,89163
GP3	17,39876	157,52479	3442,8485		
GP4	.6214650	823,421	67542,585	174,83743	,6239091
GP5	68,65327	42,41246	3527,145	15767,985	
GP6	1150,4483	1,4131476E+08		85,586	390,925
GP7	330,94664				

1	269,559	63,269	184,945	174891,1	25344,9
2	8,3218	154,7007	16164,594	15651,189	216,395
3	9,626	153,515	,914	5,569	5,642
4	8,439	159,142	119,865	31,730	31,561
5	196,000	5,388	0,00000	=,22116	0,00000
6	21290858,8	20906433,6	6,5326	8,3343	=43,2056
7	,01	,15	1010370,0	=538775,1	=353538,1
8	13,05	,000	12409,53	=9423,55	=1469,74
9	222,015	30,9798	=1119736,5	239408,2	=353538,1
10	1160336,6	15075,1	=14526,28	5637,97	=1469,74
11	17,832	168,597	18,705	140,087	124,996
12	,4	,9	=31,908	,000	21429,979
13	346,265	38,201	4515,854	316,576	540,198
14	,046	,759	=,000	=,000	20765,984
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	=,00	=,00	0,0
GP1	626,4596	1075,288	114,54741	17,51466	16875,362
GP2	-15,284658	190,06688	=1046,3214	921,499	160,83594
GP3	17,62541	157,55260	3442,8803		
GP4	.6156764	839,162	66786,572	174,72549	,6286567
GP5	68,64575	42,65235	3527,793	15886,629	
GP6	1155,9188	1,4331325E+08		86,214	393,211
GP7	331,08055				

END STAGE 1 PITCH PROGRAM
MECO

1	269,559	63,269	184,945	58977,0	25344,9
2	8,3218	154,7007	16164,594	15651,189	69,961
3	9,626	153,515	,914	5,569	5,642
4	8,439	159,142	119,865	31,730	31,561
5	196,000	5,388	0,00000	0,00000	0,00000
6	21290858,8	20906433,6	6,5326	8,3343	=43,2056
7	,01	,15	1010370,0	=538775,1	=353538,1
8	13,05	,000	12409,53	=9423,55	=1469,74
9	74,868	30,9798	=1119736,5	239408,2	=353538,1
10	1160336,6	15075,1	=14526,28	5637,97	=1469,74
11	17,832	168,597	18,705	140,087	124,996
12	,4	,9	=31,908	,000	21429,979
13	346,265	38,201	4515,854	316,576	540,198
14	,046	,759	=,000	=,000	20765,984
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	=,00	=,00	0,0
GP1	626,4596	1075,288	114,54741	17,51466	16875,362
GP2	-15,284658	190,06688	=1046,3214	921,499	160,83594
GP3	17,62541	157,55260	3442,8803		
GP4	.6156764	839,162	66786,572	174,72549	,6286567
GP5	68,64575	42,65235	3527,793	15886,629	
GP6	1155,9188	1,4331325E+08		86,214	393,211
GP7	331,08055				

1	269,892	63.394	185,768	58977,0	25276,7
2	8,3020	154,7027	16188,064	15674,522	70,174
3	9,640	153.518	,950	5,562	5,641
4	8,418	159.138	119,859	31,717	31,549
5	196,000	5.354	0,00000	0,00000	0,00000
6	21291637,5	20906447,8	6,5326	8,3343	43,2056
7	,01	,15	1014505,3	-541915,9	-354026,4
8	13,93	,000	12427,52	-9439,73	1462,49
9	75,070	30,9776	-1124577,4	241287,4	-354026,4
10	1165360,8	15100,3	-14548,04	5648,56	1462,49
11	17,778	168.551	18,638	140,146	124,954
12	,4	,9	-31,908	,000	21454,944
13	346,265	38.201	4517,366	316,576	540,319
14	,045	,759	,000	,000	20790,949
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	,00	,00	0,0
GP1	627,3268	1078.816	114,52653	17,45931	16899,202
GP2	-15.258515	190.09929	-1047,3809	924,247	160,82484
GP3	17.56976	157.55822	3442,8867		
GP4	.6145067	842.357	66635,643	174,71216	,6295810
GP5	68.64426	42.70110	3527,925	15910,491	
GP6	1157,2502	1.4371710E+08		86,341	393,675
GP7	331.10783				

1	269,892	63.394	185,768	58977,0	25276,7
2	8,3020	154,7027	16188,064	15674,522	70,174
3	9,640	153.518	,950	5,562	5,641
4	8,418	159.138	119,859	31,717	31,549
5	196,000	5.354	0,00000	0,00000	0,00000
6	21291637,5	20906447,8	6,5326	8,3343	43,2056
7	,01	,15	1014505,3	-541915,9	-354026,4
8	13,93	,000	12427,52	-9439,73	1462,49
9	75,070	30,9776	-1124577,4	241287,4	-354026,4
10	1165360,8	15100,3	-14548,04	5648,56	1462,49
11	17,778	168.551	18,638	140,146	124,954
12	,4	,9	-31,908	,000	21454,944
13	346,265	38.201	4517,366	316,576	540,319
14	,045	,759	,000	,000	20790,949
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	,00	,00	0,0
GP1	627,3268	1078.816	114,52653	17,45931	16899,202
GP2	-15.258515	190.09929	-1047,3809	924,247	160,82484
GP3	17.56976	157.55822	3442,8867		
GP4	.6145067	842.357	66635,643	174,71216	,6295810
GP5	68.64426	42.70110	3527,925	15910,491	
GP6	1157,2502	1.4371710E+08		86,341	393,675
GP7	331.10783				

1	269,893	63,395	185,773	1920,0	25276,7
2	8,3018	154,7027	16188,181	15674,638	-2,101
3	9,640	153,518	1,950	5,562	5,641
4	8,418	159,138	119,859	31,717	31,548
5	196,000	5,353	0,00000	0,00000	0,00000
6	21291642,2	20906447,9	6,5326	8,3343	=43,2056
7	,01	,15	1014530,2	-541934,8	-354029,3
8	13,03	,000	12427,61	-9439,81	=1462,44
9	2,444	30,9776	-1124606,5	241298,7	-354029,3
10	1165391,0	15100,4	-14548,15	5648,62	=1462,44
11	17,778	168,551	18,638	140,146	124,954
12	,4	,9	-31,908	,000	21455,070
13	346,265	38,201	4517,376	316,576	540,319
14	,045	,759	,000	,000	20791,075
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	,00	,00	0,0
QP1	627,3302	1078,834	114,52642	17,45903	16899,322
QP2	-15,258383	190,09945	-1047,3862	924,260	160,82478
QP3	17,56948	157,55825	3442,8867		
QP4	.6145008	842,373	66634,883	174,71211	,6295856
QP5	68,64425	42,70134	3527,926	15910,611	
QP6	1157,2572	1,4371914E+08		86,342	393,676
QP7	331,10797				

1	269,893	63,395	185,773	1920,0	25276,7
2	8,3018	154,7027	16188,181	15674,638	-2,101
3	9,640	153,518	1,950	5,562	5,641
4	8,418	159,138	119,859	31,717	31,548
5	196,000	5,353	0,00000	0,00000	0,00000
6	21291642,2	20906447,9	6,5326	8,3343	=43,2056
7	,01	,15	1014530,2	-541934,8	-354029,3
8	13,03	,000	12427,61	-9439,81	=1462,44
9	2,444	30,9776	-1124606,5	241298,7	-354029,3
10	1165391,0	15100,4	-14548,15	5648,62	=1462,44
11	17,778	168,551	18,638	140,146	124,954
12	,4	,9	-31,908	,000	21455,070
13	346,265	38,201	4517,376	316,576	540,319
14	,045	,759	,000	,000	20791,075
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	,00	,00	0,0
QP1	627,3302	1078,834	114,52642	17,45903	16899,322
QP2	-15,258383	190,09945	-1047,3862	924,260	160,82478
QP3	17,56948	157,55825	3442,8867		
QP4	.6145008	842,373	66634,883	174,71211	,6295856
QP5	68,64425	42,70134	3527,926	15910,611	
QP6	1157,2572	1,4371914E+08		86,342	393,676
QP7	331,10797				

1	278,060	63,436	186,037	1920,0	25275,9
2	8,2948	154,7039	16187,967	15674,414	=2,097
3	9,645	153,519	1,962	5,562	5,644
4	8,1411	159,140	119,858	31,713	31,544
5	196,000	5,342	0,00000	0,00000	0,00000
6	21291892,2	20906452,5	6,5326	8,3343	=43,2056
7	,01	,15	1815860,0	-542944,8	-354185,6
8	13,01	.000	12427,73	-9439,78	=1459,23
9	2,444	30,9763	-1126163,1	241903,1	-354185,6
10	1167006,8	15101,1	-14548,26	5643,55	=1459,23
11	17,761	168,537	18,616	140,165	124,940
12	,4	,9	-31,908	.000	21455,331
13	346,265	38,201	4517,861	316,576	546,321
14	,045	.759	-.000	-.000	20791,336
15	11661245,1	6263073,0	50230978,3	0,0	190,47
16	71,98	118,49	-.00	-.00	0,0
GP1	627,3393	1078,672	114,52620	17,45845	16899,575
GP2	-15,258103	190,09979	-1047,3975	924,021	160,82467
GP3	17,56889	157,55832	3442,8668		
GP4	.6144883	842,407	66633,279	174,71643	,6295810
GP5	68,64424	42,70186	3527,927	15910,865	
GP6	1157,3749	1,4372343E+06		86,343	393,681
GP7	331,10826				

1	275,000	65,284	198,410	1920,0	25239,0
2	7,9675	154,7596	16178,429	15664,402	=1,908
3	9,861	153,575	1,517	5,588	5,788
4	8,674	159,208	119,771	31,517	31,349
5	196,000	4,795	0,00000	0,00000	0,00000
6	21303336,8	20906665,4	6,5326	8,3343	=43,2056
7	,01	,16	1878012,4	-590139,2	-361107,2
8	12,24	.000	12433,18	-9437,94	=1309,44
9	2,447	30,9435	-1198916,3	270137,7	-361107,2
10	1242590,7	15131,1	-14552,99	5645,28	=1309,44
11	16,988	167,902	17,664	141,082	124,246
12	,3	,6	-31,908	.000	21467,560
13	346,265	38,201	4540,053	316,576	540,381
14	,029	.754	-.000	-.000	20803,564
15	11661245,1	6263073,0	50230978,3	0,0	190,50
16	71,99	118,51	-.00	-.00	0,0
GP1	627,7628	1080,606	114,51602	17,43122	16911,417
GP2	-15,244877	190,11580	-1047,9286	912,851	160,81949
GP3	17,54152	157,56136	3442,8900		
GP4	.6139054	844,001	66558,330	174,91841	,6293791
GP5	68,64377	42,72614	3527,990	15922,748	
GP6	1162,8769	1,4392424E+08		86,404	393,907
GP7	331,12164				

1	275,559	65.486	199,794	1920,0	25234,9
2	7,9309	154,7658	16177,419	15663,341	-1,887
3	9,885	153.581	1,579	5,591	5,807
4	8,036	159.215	119,761	31,496	31,328
5	196,000	4.734	0,00000	0,00000	0,00000
6	21304587,5	20906689,2	6,5326	8,3343	=43,2056
7	,00	,09	1084962,7	-595415,0	-361834,5
8	12,12	.000	12433,76	-9437,72	=1292,71
9	2,448	30,9399	-1207051,7	273293,3	-361834,5
10	1251049,8	15134,0	-14553,49	5644,91	=1292,71
11	16,956	167.836	17,564	141,188	124,162
12	,3	,5	-31,908	,000	21468,929
13	346,266	38,201	4542,476	316,576	540,388
14	,028	.754	,000	,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,51
16	71,99	118,51	,00	,00	0,0
QP1	627,8099	1080,798	114,51489	17,42820	16912,741
QP2	-15.243385	190.11758	-1047,9882	911,601	160,81892
QP3	17.53848	157,56170	3442,8903		
QP4	,6138402	844,179	66549,950	174,94101	,6293583
QP5	68.64372	42,72885	3527,996	15924,078	
QP6	1163,4922	1.4394670E+08		86,411	393,932
QP7	331.12312				

VERNIER ENGINE CUTOFF

1	275,559	65.486	199,794	0,0	25234,9
2	7,9309	154,7658	16177,419	15663,341	-4,323
3	9,885	153.581	1,579	5,591	5,807
4	8,036	159.215	119,761	31,496	31,328
5	196,000	4.734	0,00000	0,00000	0,00000
6	21304587,5	20906689,2	6,5326	8,3343	=43,2056
7	,00	,09	1084962,7	-595415,0	-361834,5
8	12,12	.000	12433,76	-9437,72	=1292,71
9	,000	30,9399	-1207051,7	273293,3	-361834,5
10	1251049,8	15134,0	-14553,49	5644,91	=1292,71
11	16,956	167.836	17,564	141,188	124,162
12	,3	,5	-31,908	,000	21468,929
13	346,266	38,201	4542,476	316,576	540,388
14	,028	.754	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,51
16	71,99	118,51	,00	,00	0,0
QP1	627,8099	1080,798	114,51489	17,42820	16912,741
QP2	-15.243385	190.11758	-1047,9882	911,601	160,81892
QP3	17.53848	157,56170	3442,8903		
QP4	,6138402	844,179	66549,950	174,94101	,6293583
QP5	68.64372	42,72885	3527,996	15924,078	
QP6	1163,4922	1.4394670E+08		86,411	393,932
QP7	331.12312				

1	277,559	66,200	204,747	0,0	25234,9
2	7,7993	154,7882	16169,008	15654,770	-4,248
3	9,971	153,603	1,801	5,603	5,882
4	7,900	159,244	119,726	31,417	31,250
5	196,000	4,515	0,00000	0,00000	0,00000
6	21309013,8	20906774,1	6,5326	8,3343	=43,2056
7	,00	,00	1109828,8	-614286,3	-364359,5
8	11,72	.000	12432,23	-9433,61	=1232,30
9	,000	30,9270	-1236156,1	284579,6	-364359,5
10	1281322,8	15138,9	-14550,88	5641,38	=1232,30
11	16,615	167,609	17,214	141,578	123,851
12	,3	,4	-31,908	,000	21468,929
13	346,266	38,202	4551,052	316,576	540,388
14	,024	.752	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,52
16	72,00	118,52	,00	,00	0,0
GP1	627,8100	1080,803	114,51489	17,42811	16912,812
GP2	-15,243250	190,11765	-1047,9922	906,430	160,81900
GP3	17,53839	157,56182	3442,8903		
GP4	.6138364	844,190	66549,471	175,02716	,6290964
GP5	68,64383	42,72900	3527,996	15924,156	
GP6	1165,4968	1,4394791E+08		86,411	393,932
GP7	331.12317				

STAGE I-II SEPARATION

1	277,559	66,200	204,747	0,0	14234,7
2	7,7993	154,7882	16169,008	15654,770	-4,248
3	9,971	153,603	1,801	5,603	5,882
4	7,900	159,244	119,726	31,417	31,250
5	196,000	4,515	0,00000	0,00000	0,00000
6	21309013,8	20906774,1	6,5326	8,3343	=43,2056
7	,00	0,00	1109828,8	-614286,3	-364359,5
8	11,72	.000	12432,23	-9433,61	=1232,30
9	,000	30,9270	-1236156,1	284579,6	-364359,5
10	1281322,8	15138,9	-14550,88	5641,38	=1232,30
11	16,615	167,609	17,214	141,578	123,851
12	0,0	0,0	-31,908	0,000	21468,929
13	346,266	38,202	4551,052	316,576	540,388
14	,024	.752	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,52
16	72,00	118,52	0,00	0,00	0,0
GP1	627,8100	1080,803	114,51489	17,42811	16912,812
GP2	-15,243250	190,11765	-1047,9922	906,430	160,81900
GP3	17,53839	157,56182	3442,8903		
GP4	.6138364	844,190	66549,471	175,02716	,6290964
GP5	68,64383	42,72900	3527,996	15924,156	
GP6	1165,4968	1,4394791E+08		86,411	393,932
GP7	331.12317				

1	280,000	67,056	210,794	0,0	14234,7
2	7,6386	154,8155	16158,938	15644,510	-4,158
3	10,076	153,630	2,073	5,618	5,984
4	7,735	159,278	119,684	31,322	31,155
5	196,000	4,247	0,00000	0,00000	0,00000
6	21314313,3	20906877,6	6,5326	8,3343	-43,2056
7	,00	0,00	1190173,4	-637387,6	-367277,6
8	11,28	,000	12430,25	-9428,54	-1158,61
9	0,000	30,9116	-1271670,8	298345,0	-367277,6
10	1318283,0	15143,6	-14547,58	5637,05	-1158,61
11	16,272	167,346	16,807	142,068	123,450
12	0,0	0,0	-31,908	0,000	21468,929
13	346,266	38,262	4561,318	316,576	540,388
14	,020	,750	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,53
16	72,00	118,53	0,00	0,00	0,0
GP1	627,8101	1080,809	114,51489	17,42800	16912,899
GP2	-15,243084	190,11773	-1047,9971	900,122	160,81910
GP3	17,53828	157,56198	3442,8903		
GP4	.6138318	844,202	66548,883	175,13226	,6287828
GP5	68,64396	42,72918	3527,996	15924,252	
GP6	1167,9435	1,4394938E+08		86,410	393,932
GP7	331.12322				

1	281,859	67,592	214,656	0,0	14234,7
2	7,5358	154,8328	16152,619	15638,073	-4,100
3	10,143	153,647	2,247	5,628	6,054
4	7,629	159,301	119,657	31,261	31,094
5	196,000	4,076	0,00000	0,00000	0,00000
6	21317638,9	20906943,6	6,5326	8,3343	-43,2056
7	,00	0,00	1159551,2	-652004,1	-369047,2
8	11,04	,000	12428,92	-9425,26	-1111,58
9	0,000	30,9019	-1294346,8	307131,0	-369047,2
10	1341893,7	15145,9	-14545,40	5634,27	-1111,58
11	16,059	167,187	16,557	142,390	123,182
12	0,0	0,0	-31,908	0,000	21468,929
13	346,266	38,202	4567,759	316,576	540,388
14	,018	,748	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,54
16	72,01	118,53	0,00	0,00	0,0
GP1	627,8102	1080,813	114,51489	17,42794	16912,955
GP2	-15,242978	190,11779	-1048,0002	896,095	160,81917
GP3	17,53822	157,56207	3442,8903		
GP4	.6138288	844,210	66548,512	175,19936	,6285859
GP5	68,64405	42,72929	3527,996	15924,313	
GP6	1169,5061	1,4395032E+08		86,410	393,932
GP7	331.12325				

STAGE II IGNITION SIGNAL

1	281,559	67.592	214,656	0,0	14234,7
2	7,5358	154,8328	16152,619	15638,073	-4,100
3	10,143	153,647	2,247	5,628	6,054
4	7,629	159,301	119,657	31,261	31,094
5	196,000	4,676	0,00000	0,00000	0,00000
6	21317638,9	20906943,6	6,5326	8,3343	43,2056
7	,00	0,00	1159551,2	-652004,1	-369047,2
8	11,04	,000	12428,02	-9425,26	-1111,58
9	0,000	30,9019	-1294348,8	307131,0	-369047,2
10	1341693,7	15145,9	-14545,40	5634,27	-1111,58
11	16,059	167,187	16,557	142,390	123,182
12	0,0	0,0	-31,908	0,000	21468,929
13	346,266	38,202	4567,759	316,576	540,388
14	,018	,748	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,54
16	72,01	118,53	0,00	0,00	0,0
GP1	627,8162	1080,813	114,81480	17,42794	16912,955
GP2	-15,242978	190,11779	-1048,0002	896,095	160,81917
GP3	17,53822	157,56207	3442,8903		
GP4	6138288	844,210	66548,512	175,19936	6285850
GP5	68,64405	42,72929	3527,996	15924,313	
GP6	1169,5061	1,4395032E+08		86,410	393,932
GP7	331,12325				

1	281,769	67.664	215,176	0,0	14234,7
2	7,5220	154,8351	16151,774	15637,213	-4,092
3	10,152	153.649	2,270	5,629	6,064
4	7,615	159.304	119,654	31,253	31,086
5	196,000	4.053	0,00000	0,00000	0,00000
6	21318083,3	20906952,5	6,5326	8,3343	=43,2056
7	.00	0.00	1162161,2	-653983,4	-369280,0
8	11,00	.000	12428,74	-9424,82	=1105,24
9	0,000	30,9007	-1297403,3	308314,1	-369280,0
10	1345074,3	15146,1	-14545,11	5633,89	=1105,24
11	16,030	167.166	16,524	142,434	123,145
12	0,0	0,0	-31,908	0,000	21468,929
13	346,266	38.202	4568,620	316,576	540,388
14	1018	.748	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,54
16	72,01	118,53	0,00	0,00	0,0
QP1	627,8102	1080.814	114,51489	17,42793	16912,962
QP2	-15.242964	190.11779	-1048,0006	895,552	160,81918
QP3	17.53821	157.56209	3442,8903		
QP4	.6138284	844.211	66548,462	175,20839	,6285596
QP5	68.64406	42.72931	3527,996	15924,322	
QP6	1169,7166	1,4395045E+08		86,410	393,932
QP7	331.12325				

1	281,769	67.664	215,176	1815,5	14234,7
2	7,5220	154,8351	16151,774	15637,213	-4,011
3	10,152	153.649	2,270	5,629	6,064
4	7,615	159.304	119,654	31,253	31,086
5	196,000	4.053	0,00000	0,00000	0,00000
6	21318083,3	20906952,5	6,5326	8,3343	=43,2056
7	.00	0.00	1162161,2	-653983,4	-369280,0
8	11,00	.000	12428,74	-9424,82	=1105,24
9	4,104	30,9007	-1297403,3	308314,1	-369280,0
10	1345074,3	15146,1	-14545,11	5633,89	=1105,24
11	16,030	167.166	16,524	142,434	123,145
12	0,0	0,0	-31,908	0,000	21468,929
13	346,266	38.202	4568,620	316,576	540,388
14	1018	.748	0,000	0,000	20804,932
15	11661245,1	6263073,0	50230978,3	0,0	190,54
16	72,01	118,53	0,00	0,00	0,0
QP1	627,8102	1080.814	114,51489	17,42793	16912,962
QP2	-15.242964	190.11779	-1048,0006	895,552	160,81918
QP3	17.53821	157.56209	3442,8903		
QP4	.6138284	844.211	66548,462	175,20839	,6285596
QP5	68.64406	42.72931	3527,996	15924,322	
QP6	1169,7166	1,4395045E+08		86,410	393,932
QP7	331.12325				

1	281,859	67,694	215,399	8990,2	14231,6
2	7,5162	154,8361	16152,511	15637,938	16,122
3	10,156	153,650	2,280	5,629	6,068
4	7,609	159,304	119,652	31,249	31,082
5	196,000	4,043	0,00000	0,00000	0,00000
6	21318273,5	20906956,3	6,5326	8,3343	43,2056
7	,60	0,00	1103279,8	-654831,6	-369379,3
8	10,99	,000	12429,47	-9425,37	-1102,65
9	20,325	30,9001	-1298712,4	308821,2	-369379,3
10	1346437,5	15147,3	-14545,95	5634,22	-1102,65
11	16,018	167,157	16,510	142,452	123,130
12	0,0	0,0	-31,908	0,000	21470,028
13	346,266	38,202	4568,988	316,576	540,395
14	,018	,748	0,000	0,000	20806,031
15	11661245,1	6263073,0	50230978,3	486,3	190,54
16	72,01	118,53	0,00	0,00	0,0
QP1	627,8472	1080,965	114,51400	17,42556	16914,011
QP2	-15,241764	190,11920	-1048,0481	895,474	160,81871
QP3	17,53582	157,56233	3442,8906		
QP4	.6137767	844,352	66541,817	175,21110	16285911
QP5	68,64400	42,73146	3528,001	15925,377	
QP6	1169,8512	1,4396823E+08		86,415	393,952
QP7	331,12440				

STAGE II 88 PERCENT CHAMBER PRESSURE

1	281,859	67,694	215,399	8990,2	14231,6
2	7,5162	154,8361	16152,511	15637,938	16,122
3	10,156	153,650	2,280	5,629	6,068
4	7,609	159,304	119,652	31,249	31,082
5	196,000	4,043	0,00000	0,00000	0,00000
6	21318273,5	20906956,3	6,5326	8,3343	43,2056
7	,00	0,00	1103279,8	-654831,6	-369379,3
8	10,99	,000	12429,47	-9425,37	-1102,65
9	20,325	30,9001	-1298712,4	308821,2	-369379,3
10	1346437,5	15147,3	-14545,95	5634,22	-1102,65
11	16,018	167,157	16,510	142,452	123,130
12	0,0	0,0	-31,908	0,000	21470,028
13	346,266	38,202	4568,988	316,576	540,395
14	,018	,748	0,000	0,000	20806,031
15	11661245,1	6263073,0	50230978,3	486,3	190,54
16	72,01	118,53	0,00	0,00	0,0
QP1	627,8472	1080,965	114,51400	17,42556	16914,011
QP2	-15,241764	190,11920	-1048,0481	895,474	160,81871
QP3	17,53582	157,56233	3442,8906		
QP4	.6137767	844,352	66541,817	175,21110	16285911
QP5	68,64400	42,73146	3528,001	15925,377	
QP6	1169,8512	1,4396823E+08		86,415	393,952
QP7	331,12440				

1	282,559	67,932	217,134	8988,8	14210,2
2	7,4724	154,8428	16163,927	15649,242	16,173
3	10,186	153,658	2,356	5,628	6,096
4	7,563	159,309	119,640	31,222	31,055
5	196,000	3,969	0,00000	0,00000	0,00000
6	21319748,8	20906985,9	6,5326	8,3343	=43,2056
7	,00	0,00	1171983,9	=661432,2	=370144,4
8	1,90	,000	12439,24	=9433,49	=1083,15
9	20,352	30,8958	=1308898,6	312766,9	=370144,4
10	1357045,7	15161,8	=14557,59	5639,34	=1083,15
11	15,924	167,088	16,401	142,600	123,005
12	0,0	0,0	=31,908	0,000	21484,265
13	346,266	38,202	4571,843	316,576	540,475
14	1017	,748	0,000	0,000	20820,268
15	11661245,1	6263073,0	50230978,3	6778,9	190,54
16	72,01	118,53	0,00	0,00	0,0
QP1	628,3273	1082,921	114,50243	17,39487	16927,572
QP2	-15,226253	190,13737	=1048,6628	895,665	160,81263
QP3	17,50496	157,56543	3442,8942		
QP4	,6131067	846,185	66455,935	175,22610	,6290571
QP5	68,64317	42,75932	3528,069	15939,031	
QP6	1171,1280	1,4419840E+08		86,481	394,211
QP7	331.13932				

1	282,559	67,932	217,134	8988,8	14210,2
2	7,4724	154,8428	16163,927	15649,242	16,173
3	10,186	153,658	2,356	5,628	6,096
4	7,563	159,309	119,640	31,222	31,055
5	196,000	3,969	0,00000	0,00000	0,00000
6	21319748,8	20906985,9	6,5326	8,3343	=43,2056
7	,00	0,00	1171983,9	=661432,2	=370144,4
8	1,90	,000	12439,24	=9433,49	=1083,15
9	20,352	30,8958	=1308898,6	312766,9	=370144,4
10	1357045,7	15161,8	=14557,59	5639,34	=1083,15
11	15,924	167,088	16,401	142,600	123,005
12	0,0	0,0	=31,908	0,000	21484,265
13	346,266	38,202	4571,843	316,576	540,475
14	1017	,748	0,000	0,000	20820,268
15	11661245,1	6263073,0	50230978,3	6778,9	190,54
16	72,01	118,53	0,00	0,00	0,0
QP1	628,3273	1082,921	114,50243	17,39487	16927,572
QP2	-15,226253	190,13737	=1048,6628	895,665	160,81263
QP3	17,50496	157,56543	3442,8942		
QP4	,6131067	846,185	66455,935	175,22610	,6290571
QP5	68,64317	42,75932	3528,069	15939,031	
QP6	1171,1280	1,4419840E+08		86,481	394,211
QP7	331.13932				

1	283,559	68,270	219,615	8987,7	14179,6
2	7,4102	154,8524	16180,299	15665,452	16,248
3	10,229	153,669	2,464	5,627	6,136
4	7,499	159,316	119,623	31,183	31,016
5	196,000	3,863	0,00000	0,00000	0,00000
6	21321843,2	20907028,2	6,5326	8,3343	43,2056
7	,00	0,00	1184430,1	-670871,5	-371213,6
8	10,77	,000	12453,22	-9445,11	-1055,31
9	20,393	30,8897	-1323464,5	318409,9	-371213,6
10	1372217,8	15182,4	-14574,23	5646,65	-1055,31
11	15,791	166,991	16,247	142,813	122,825
12	0,0	0,0	-31,908	0,000	21504,638
13	346,266	38,202	4575,892	316,576	540,591
14	,016	,747	0,000	0,000	20840,641
15	11661245,1	6263073,0	50230978,3	15767,2	190,54
16	72,01	118,53	0,00	0,00	0,0
GP1	629,0148	1085,723	114,48588	17,35090	16946,975
GP2	-15,204037	190,16342	-1049,5448	895,943	160,80397
GP3	17,46076	157,56987	3442,8992		
GP4	,6121469	848,812	66333,262	175,24753	,6297252
GP5	68,64199	42,79927	3528,166	15958,569	
GP6	1172,9554	1,4452802E+08		86,574	394,582
GP7	331,16068				

BEGIN STAGE II PITCH PROGRAM

1	283,559	68,270	219,615	8987,7	14179,6
2	7,4102	154,8524	16180,299	15665,452	16,248
3	10,229	153,669	2,464	5,627	6,136
4	7,499	159,316	119,623	31,183	31,016
5	196,000	3,863	0,00000	-1,08178	0,00000
6	21321843,2	20907028,2	6,5326	8,3343	43,2056
7	,00	0,00	1184430,1	-670871,5	-371213,6
8	10,77	,000	12453,22	-9445,11	-1055,31
9	20,393	30,8897	-1323464,5	318409,9	-371213,6
10	1372217,8	15182,4	-14574,23	5646,65	-1055,31
11	15,791	166,991	16,247	142,813	122,825
12	0,0	0,0	-31,908	0,000	21504,638
13	346,266	38,202	4575,892	316,576	540,591
14	,016	,747	0,000	0,000	20840,641
15	11661245,1	6263073,0	50230978,3	15767,2	190,54
16	72,01	118,53	0,00	0,00	0,0
GP1	629,0148	1085,723	114,48588	17,35090	16946,975
GP2	-15,204037	190,16342	-1049,5448	895,943	160,80397
GP3	17,46076	157,56987	3442,8992		
GP4	,6121469	848,812	66333,262	175,24753	,6297252
GP5	68,64199	42,79927	3528,166	15958,569	
GP6	1172,9554	1,4452802E+08		86,574	394,582
GP7	331,16068				

1	285,000	68,752	223,196	8986,0	14138,5
2	7,3209	154,8662	16204,021	15688,944	16,357
3	10,173	153,683	2,501	5,625	6,149
4	7,407	159,326	119,598	31,126	30,960
5	196,000	3,710	0,00000	-0,08178	0,00000
6	21324834,5	20907089,2	6,4226	8,1737	-43,2189
7	,00	0,00	1202389,7	-684494,0	-372705,4
8	10,59	,000	12473,38	-9461,87	-1015,18
9	20,453	30,8811	-1344483,3	326554,3	-372705,4
10	1394116,9	15211,9	-14598,23	5657,21	-1015,18
11	15,603	166,855	16,101	142,798	122,899
12	0,0	0,0	-31,908	0,000	21534,068
13	346,266	38,202	4581,665	316,576	540,760
14	,015	,745	0,000	0,000	20870,071
15	11661245,1	6263073,0	50230978,3	28717,3	190,55
16	72,01	118,54	0,00	0,00	0,0
GP1	630,0072	1089,772	114,46197	17,28739	16974,998
GP2	-15,171854	190,20109	-1050,8245	896,350	160,79152
GP3	17,39689	157,57624	3442,9065		
GP4	.6107581	852,619	66156,480	175,27845	,6306927
GP5	68,64029	42,85715	3528,304	15986,802	
GP6	1175,5975	1,4500474E+08		86,708	395,117
GP7	331,19149				

JETTISON FAIRING

1	285,000	68,752	223,196	8986,0	13567,5
2	7,3209	154,8662	16204,021	15688,944	17,209
3	10,173	153,683	2,501	5,625	6,149
4	7,407	159,326	119,598	31,126	30,960
5	196,000	3,710	0,00000	-0,08178	0,00000
6	21324834,5	20907089,2	6,4226	8,1737	-43,2189
7	,00	0,00	1202389,7	-684494,0	-372705,4
8	10,59	,000	12473,38	-9461,87	-1015,18
9	21,310	30,8811	-1344483,3	326554,3	-372705,4
10	1394116,9	15211,9	-14598,23	5657,21	-1015,18
11	15,603	166,855	16,101	142,798	122,899
12	0,0	0,0	-31,908	0,000	21534,068
13	346,266	38,202	4581,665	316,576	540,760
14	,015	,745	0,000	0,000	20870,071
15	11661245,1	6263073,0	50230978,3	28717,3	190,55
16	72,01	118,54	0,00	0,00	0,0
GP1	630,0072	1089,772	114,46197	17,28739	16974,998
GP2	-15,171854	190,20109	-1050,8245	896,350	160,79152
GP3	17,39689	157,57624	3442,9065		
GP4	.6107581	852,619	66156,480	175,27845	,6306927
GP5	68,64029	42,85715	3528,304	15986,802	
GP6	1175,5975	1,4500474E+08		86,708	395,117
GP7	331,19149				

1	290,600	70,386	235,676	8980,3	13414,7
2	7,0151	154,9137	16291,862	15775,984	17,607
3	9,981	153,731	2,628	5,615	6,192
4	7,090	159,358	119,512	30,930	30,763
5	196,000	3,184	0,00000	0,08178	0,00000
6	21334970,5	20907301,2	6,0403	7,6157	43,2633
7	1,60	0,00	1264939,9	-731956,6	-377433,9
8	10,07	0,00	12546,76	-9523,28	-876,14
9	21,539	30,8517	-1417692,9	354937,2	-377433,9
10	1470439,7	15316,9	-14685,69	5696,00	-876,14
11	14,971	166,414	15,632	142,722	123,163
12	0,0	0,0	-31,908	0,000	21641,185
13	346,266	38,202	4601,136	316,576	541,380
14	1,011	740	0,000	0,000	20977,189
15	11661245,1	6263073,0	50230978,3	73633,2	190,56
16	72,02	118,55	0,00	0,00	0,0
QP1	633,5980	1104,483	114,37518	17,05659	17076,941
QP2	-15,053565	190,33862	-1055,5428	898,391	160,74686
QP3	17,16481	157,59913	3442,9329		
QP4	.6056780	866,600	65517,102	175,38205	16342623
QP5	68,63410	43,06965	3528,793	16089,675	
QP6	1185,0385	1,4674558E+08		87,180	397,051
QP7	331.30281				

1	291,559	70,882	239,584	8978,5	13367,1
2	6,9208	154,9285	16319,654	15803,531	17,732
3	9,921	153,747	2,667	5,611	6,206
4	6,993	159,368	119,485	30,868	30,702
5	196,000	3,020	0,00000	0,08178	0,00000
6	21338054,4	20907367,4	5,9210	7,4415	43,2766
7	1,00	0,00	1284818,2	-746818,4	-378765,9
8	9,92	0,00	12569,74	-9542,53	-832,71
9	21,611	30,8428	-1440609,2	363826,8	-378765,9
10	1494344,0	15349,3	-14713,08	5708,18	-832,71
11	14,780	166,285	15,496	142,692	123,249
12	0,0	0,0	-31,908	0,000	21674,820
13	346,266	38,202	4607,032	316,576	541,577
14	1,010	738	0,000	0,000	21010,824
15	11661245,1	6263073,0	50230978,3	87632,0	190,57
16	72,02	118,55	0,00	0,00	0,0
QP1	634,7190	1109,095	114,34800	16,98422	17108,938
QP2	-15,016065	190,38195	-1057,0439	899,039	160,73304
QP3	17,09284	157,60622	3442,9411		
QP4	.6040745	871,031	65317,629	175,41462	16353902
QP5	68,63216	43,13698	3528,942	16122,015	
QP6	1188,0146	1,4729410E+08		87,324	397,654
QP7	331.33751				

1	291,559	70,882	239,584	8978,5	13367,1
2	6,9208	154,9285	16319,654	15803,531	17,732
3	9,921	153,747	2,067	5,611	6,206
4	6,993	159,366	119,485	30,868	30,702
5	196,000	3,020	0,00000	-1,08178	0,00000
6	21338054,4	20907367,4	5,9210	7,4415	-43,2766
7	,00	0,00	1284818,2	-746818,4	-378765,9
8	9,92	,000	12569,74	-9542,53	-832,71
9	21,611	30,8428	-1440609,2	363826,8	-378765,9
10	1494344,0	15349,3	-14713,08	5708,18	-832,71
11	14,780	166,285	15,496	142,692	123,249
12	0,0	0,0	-31,908	0,000	21674,820
13	346,266	38,202	4687,032	316,576	541,577
14	,010	,738	0,000	0,000	21010,824
15	11661245,1	6263073,0	50230978,3	87632,0	190,57
16	72,02	118,55	0,00	0,00	0,0
QP1	634,7190	1109,095	114,34800	16,98422	17108,938
QP2	-15,016065	190,38195	-1057,0439	899,039	160,73304
QP3	17,09204	157,60622	3442,9411		
QP4	,6040745	871,031	65317,629	175,41462	,6353902
QP5	68,63216	43,13698	3528,942	16122,015	
QP6	1188,0146	1,4729410E+08		87,324	397,654
QP7	331,33751				

1	300,000	73,468	260,884	8974,9	13109,3
2	6,4189	155,0079	16473,539	15956,131	18,426
3	9,600	153,828	2,870	5,592	6,277
4	6,474	159,421	119,339	30,532	30,368
5	196,000	2,144	0,00000	-1,08178	0,00000
6	21354125,2	20907726,7	5,2733	6,4974	-43,3439
7	,00	0,00	1391146,9	-827809,9	-384800,0
8	9,29	,000	12694,98	-9647,77	-596,80
9	22,027	30,7963	-1565431,6	412289,9	-384800,0
10	1624641,9	15522,9	-14862,48	5774,82	-596,80
11	13,800	165,653	14,838	142,470	123,740
12	0,0	0,0	-31,908	0,000	21856,984
13	346,266	38,202	4637,528	316,576	542,669
14	,007	,729	0,000	0,000	21194,987
15	11661245,1	6263073,0	50230978,3	163404,5	190,58
16	72,02	118,56	0,00	0,00	0,0
QP1	640,8049	1134,301	114,19970	16,58877	17284,034
QP2	-14,807931	190,62049	-1065,4300	902,650	160,65905
QP3	16,69437	157,64419	3442,9853		
QP4	,5952250	895,636	64236,234	175,59313	,6416231
QP5	68,62158	43,51075	3529,716	16299,406	
QP6	1204,4098	1,5031377E+08		88,070	400,913
QP7	331,52526				

1	301,559	73,927	264,844	8974,3	13061,7
2	6,3279	155,0225	16502,596	15984,957	18,555
3	9,541	153,843	2,906	5,589	6,291
4	6,380	159,431	119,312	30,470	30,306
5	196,000	1,983	0,00000	-1,08178	0,00000
6	21356978,7	20907793,2	5,1535	6,3228	=43,3555
7	,00	0,00	1410956,5	-842866,1	-385696,4
8	9,19	.000	12718,27	-9667,39	=553,09
9	22,106	30,7881	-1588623,8	421302,6	-385696,4
10	1648867,0	15554,8	-14890,28	5787,27	=553,09
11	13,627	165,547	14,729	142,419	123,836
12	0,0	0,0	-31,908	0,000	21893,385
13	346,266	38,202	4642,901	316,576	542,875
14	,007	,727	0,000	0,000	21229,389
15	11661245,1	6263073,0	50230978,3	177395,9	190,59
16	72,02	118,56	0,00	0,00	0,0
GP1	641,9324	1139,000	114,17209	16,51504	17316,724
GP2	-14,768554	190,66531	-1067,0278	903,338	160,64553
GP3	16,62822	157,65114	3442,9935		
GP4	.5935588	900,298	64036,231	175,62652	,6427977
GP5	68,61961	43,58155	3529,853	16332,600	
GP6	1207,4917	1,5088093E+08		88,203	401,514
GP7	331.55992				

1	301,559	73,927	264,844	8974,3	13061,7
2	6,3279	155,0225	16502,596	15984,957	18,555
3	9,541	153,843	2,906	5,589	6,291
4	6,380	159,431	119,312	30,470	30,306
5	196,000	1,983	0,00000	-1,08178	0,00000
6	21356978,7	20907793,2	5,1535	6,3228	=43,3555
7	,00	0,00	1410956,5	-842866,1	-385696,4
8	9,19	.000	12718,27	-9667,39	=553,09
9	22,106	30,7881	-1588623,8	421302,6	-385696,4
10	1648867,0	15554,8	-14890,28	5787,27	=553,09
11	13,627	165,547	14,729	142,419	123,836
12	0,0	0,0	-31,908	0,000	21893,385
13	346,266	38,202	4642,901	316,576	542,875
14	,007	,727	0,000	0,000	21229,389
15	11661245,1	6263073,0	50230978,3	177395,9	190,59
16	72,02	118,56	0,00	0,00	0,0
GP1	641,9324	1139,000	114,17209	16,51504	17316,724
GP2	-14,768554	190,66531	-1067,0278	903,338	160,64553
GP3	16,62822	157,65114	3442,9935		
GP4	.5935588	900,298	64036,231	175,62652	,6427977
GP5	68,61961	43,58155	3529,853	16332,600	
GP6	1207,4917	1,5088093E+08		88,203	401,514
GP7	331.55992				

1	310,000	76,309	286,427	8981,4	12803,8
2	5,8438	155,1011	16063,495	16144,645	19,284
3	9,224	153,925	3,094	5,567	6,360
4	5,879	159,482	119,165	30,130	29,967
5	196,000	1,120	0,00000	0,08178	0,00000
6	21371814,3	20908154,1	4,5034	5,3764	43,4136
7	0,00	0,00	1518846,7	024920,3	389363,8
8	8,75	0,00	12845,39	9774,76	315,65
9	22,569	30,7453	1714951,8	470439,6	389363,8
10	1780892,2	15727,1	15042,07	5855,43	315,65
11	12,729	165,021	14,198	142,094	124,384
12	0,0	0,0	31,908	0,000	22081,921
13	346,266	38,202	4670,626	316,576	544,023
14	0,05	0,718	0,000	0,000	21417,925
15	11661245,1	6263073,0	50230978,3	253177,9	190,60
16	72,03	118,57	0,00	0,00	0,0
GP1	648,8632	1164,717	114,02128	16,11154	17495,805
GP2	-14,550233	190,91257	1075,9605	907,206	160,57304
GP3	16,21444	157,68836	3443,0375		
GP4	.5843546	926,222	62951,112	175,80948	6492904
GP5	68,60885	43,97524	3530,568	16514,826	
GP6	1224,4904	1,5400666E+08		88,890	404,767
GP7	331.74753				

1	320,000	78,913	312,308	8989,9	12498,2
2	5,2900	155,1933	16862,061	16341,853	20,160
3	8,853	154,020	3,301	5,539	6,438
4	5,307	159,540	118,991	29,723	29,562
5	196,000	0,114	0,00000	0,08178	0,00000
6	21388068,0	20908583,4	3,7308	4,2530	43,4723
7	0,00	0,00	1648063,0	1023314,4	391106,4
8	8,36	0,00	12998,29	9904,52	32,55
9	23,143	30,6986	1866283,5	529405,2	391106,4
10	1939188,9	15932,6	12224,81	5938,02	32,55
11	11,737	164,485	13,678	141,609	125,096
12	0,0	0,0	31,908	0,000	22310,457
13	346,266	38,202	4700,560	316,576	545,447
14	0,004	0,707	0,000	0,000	21646,460
15	11661245,1	6263073,0	50230978,3	343034,4	190,61
16	72,03	118,58	0,00	0,00	0,0
GP1	655,3941	1195,820	113,83944	15,62351	17712,735
GP2	-14,280461	191,21638	1087,1892	912,139	160,48856
GP3	15,72361	157,73169	3443,0895		
GP4	.5730330	958,512	61660,210	176,03129	6572772
GP5	68,59592	44,46564	3531,352	16736,378	
GP6	1245,3553	1,5783571E+08		89,641	408,614
GP7	331.96961				

1	330,990	81,286	338,535	9004,3	12192,2
2	4,7579	155,2844	17069,457	16547,967	21,069
3	8,488	154,115	3,491	5,509	6,510
4	4,758	159,596	118,815	29,311	29,151
5	196,000	-.875	0,00000	-.08178	0,00000
6	21402917,5	20909014,6	2,9562	3,1276	=43,5200
7	0,00	0,00	1778821,5	-1123020,7	-390007,7
8	8,08	.000	13153,89	-10037,26	252,66
9	23,762	30,6560	-2019459,4	589207,1	-390007,7
10	2099555,3	16141,4	-15410,97	6022,73	252,66
11	10,808	164,026	13,253	141,027	125,873
12	0,0	0,0	-31,908	0,000	22544,936
13	346,266	33,202	4727,461	316,576	546,943
14	0,003	.696	0,000	0,000	21880,940
15	11661245,1	6263073,0	50230978,3	433000,7	190,62
16	72,04	118,59	0,00	0,00	0,0
QP1	662,8167	1227,691	113,65374	15,12341	17935,197
QP2	-13,998708	191,53342	-1099,1709	917,517	160,40545
QP3	15,22962	157,77421	3443,1412		
QP4	.5612306	992,655	60362,771	176,25890	,6655924
QP5	68,58276	44,98450	3532,068	16964,398	
QP6	1267,0822	1,6181097E+08		90,324	412,453
QP7	332.19136				

1	340,000	83,433	345,119	9019,8	11885,7
2	4,2477	155,3745	17285,990	16763,289	21,999
3	8,128	154,210	3,663	5,475	6,575
4	4,232	159,650	118,638	28,893	28,734
5	196,000	-1,846	0,00000	-.08178	0,00000
6	21416395,6	20909447,7	2,1799	2,0006	=43,5566
7	0,00	0,00	1911150,7	-1224070,3	-386045,7
8	7,95	.000	13312,47	-10173,22	540,14
9	24,416	30,6174	-2174515,5	649867,3	-386045,7
10	2262032,5	16355,0	-15600,88	6109,71	540,14
11	9,930	163,626	12,905	140,361	126,709
12	0,0	0,0	-31,908	0,000	22785,795
13	346,266	38,202	4751,460	316,576	548,512
14	0,003	.685	0,000	0,000	22121,798
15	11661245,1	6263073,0	50230978,3	523121,2	190,63
16	72,04	118,59	0,00	0,00	0,0
QP1	670,3539	1260,427	113,46364	14,60968	18163,646
QP2	-13,704932	191,86553	-1111,9704	923,429	160,32350
QP3	14,70389	157,81595	3443,1828		
QP4	.5489119	1028,830	59057,676	176,49270	,6742479
QP5	68,56937	45,53479	3532,719	17199,307	
QP6	1289,7629	1,6594443E+08		90,942	416,281
QP7	332.41263				

1	350,000	85,360	392,068	9035,3	11578,8
2	3,7598	155,4636	17511,882	16988,033	22,953
3	7,775	154,304	3,818	5,439	6,632
4	3,729	159,702	118,460	28,469	28,312
5	196,000	-2,801	0,00000	-1,08178	0,00000
6	21428536,2	20909882,6	1,4023	,8724	-43,5822
7	,00	0,00	2045081,4	-1326496,4	-379196,8
8	7,85	,000	13474,22	-10312,60	830,08
9	25,106	30,5827	-2331490,4	711409,4	-379196,8
10	2426675,1	16574,6	-15794,79	6199,11	830,08
11	9,094	163,275	12,622	139,620	127,599
12	0,0	0,0	-31,908	0,000	23033,381
13	346,266	38,202	4772,690	316,576	550,155
14	,002	,674	0,000	0,000	22369,384
15	11661245,1	6263073,0	50230978,3	613396,6	190,64
16	72,64	118,60	0,00	0,00	0,0
GP1	678,0281	1294,126	113,26862	14,08080	18398,459
GP2	-13,399174	192,21466	-1125,6543	929,960	160,24255
GP3	14,17188	157,85691	3443,2442		
GP4	.5360444	1067,219	57744,400	176,73322	16832525
GP5	68,55574	46,11963	3533,305	17441,445	
GP6	1313,4952	1,7024710E+08		91,496	420,094
GP7	332.63310				

1	350,000	85,360	392,068	9035,3	11578,8
2	3,7598	155,4636	17511,882	16988,033	22,953
3	7,775	154,304	3,818	5,439	6,632
4	3,729	159,702	118,460	28,469	28,312
5	196,000	-2,801	0,00000	-1,08178	0,00000
6	21428536,2	20909882,6	1,4023	,8724	-43,5822
7	,00	0,00	2045081,4	-1326496,4	-379196,8
8	7,85	,000	13474,22	-10312,60	830,08
9	25,106	30,5827	-2331490,4	711409,4	-379196,8
10	2426675,1	16574,6	-15794,79	6199,11	830,08
11	9,094	163,275	12,622	139,620	127,599
12	0,0	0,0	-31,908	0,000	23033,381
13	346,266	38,202	4772,690	316,576	550,155
14	,002	,674	0,000	0,000	22369,384
15	11661245,1	6263073,0	50230978,3	613396,6	190,64
16	72,64	118,60	0,00	0,00	0,0
GP1	678,0281	1294,126	113,26862	14,08080	18398,459
GP2	-13,399174	192,21466	-1125,6543	929,960	160,24255
GP3	14,17188	157,85691	3443,2442		
GP4	.5360444	1067,219	57744,400	176,73322	16832525
GP5	68,55574	46,11963	3533,305	17441,445	
GP6	1313,4952	1,7024710E+08		91,496	420,094
GP7	332.63310				

1	360,000	87,072	419,397	9050,8	11271,3
2	3,2945	155,5516	17747,371	17222,433	23,932
3	7,427	154,397	3,955	5,400	6,680
4	3,249	159,751	118,281	28,039	27,884
5	196,000	-3,738	0,00000	-0,08178	0,00000
6	21439374,3	20910319,4	,6240	-0,2564	-43,5966
7	,00	0,00	-2180446,4	-1430334,3	-369435,3
8	7,81	,000	13639,36	-10455,60	1122,68
9	25,836	30,5516	-2490425,4	773858,0	-369435,3
10	2593547,4	16801,1	-15992,98	6291,05	1122,68
11	8,294	162,963	12,391	138,815	128,538
12	0,0	0,0	-31,908	0,000	23288,057
13	346,266	38,202	4791,281	316,576	551,872
14	,002	,663	0,000	0,000	22624,060
15	11661245,1	6263073,0	50230978,3	793827,0	190,65
16	72,05	118,60	0,00	0,00	0,0
QP1	685,8648	1328,900	113,06810	13,53500	18640,027
QP2	-13,081433	192,58309	-1140,2962	937,210	160,16245
QP3	13,62283	157,89710	3443,2954		
QP4	,5225932	1108,026	56422,425	176,98108	,6926156
QP5	68,54188	46,74251	3533,828	17691,166	
QP6	1338,3894	1,7473077E+08		91,988	423,886
QP7	332,85239				

1	370,000	88,575	447,117	9066,3	10963,4
2	2,8519	155,6386	17992,728	17466,753	24,940
3	7,086	154,490	4,075	5,359	6,718
4	2,794	159,798	118,100	27,604	27,450
5	196,000	-4,657	0,00000	-0,08178	0,00000
6	21448946,8	20910757,8	-0,1548	-1,3857	-43,6000
7	,00	0,00	-2317880,7	-1535621,2	-356733,7
8	7,83	,000	13808,13	-10602,45	1418,14
9	26,607	30,5246	-2651364,6	837239,4	-356733,7
10	2762721,7	17035,1	-16195,66	6385,69	1418,14
11	7,524	162,684	12,207	137,955	129,517
12	0,0	0,0	-31,908	0,000	23550,218
13	346,266	38,202	4807,367	316,576	553,663
14	,002	,653	0,000	0,000	22886,221
15	11661245,1	6263073,0	50230978,3	794412,4	190,66
16	72,05	118,61	0,00	0,00	0,0
QP1	693,8938	1364,878	112,86137	12,97024	18888,774
QP2	-12,751644	192,97350	-1155,9790	945,297	160,08305
QP3	13,08467	157,93652	3443,3464		
QP4	,5085201	1151,481	55091,171	177,23699	,7023477
QP5	68,52779	47,40741	3534,289	17948,853	
QP6	1364,5717	1,7940832E+08		92,417	427,651
QP7	333,07004				

1	380,000	89,876	475,243	9081,8	10655,0
2	2,4324	155,7246	18248,272	17721,308	25,980
3	6,752	154,582	4,177	5,315	6,746
4	2,362	159,843	117,918	27,161	27,009
5	196,000	-5,559	0,00000	-,08178	0,00000
6	21457291,8	20911198,0	-,9334	2,5148	43,5922
7	,00	0,00	2456821,9	-1642397,0	-341062,2
8	7,86	.000	13980,78	-10753,40	1716,69
9	27,424	30,5009	-2814354,8	901581,4	-341062,2
10	2934277,6	17277,5	-16403,23	6483,20	1716,69
11	6,781	162,433	12,062	137,048	130,532
12	0,0	0,0	-31,908	0,000	23820,313
13	346,266	38,202	4821,079	316,576	555,526
14	1,002	.642	0,000	0,000	23156,317
15	11661245,1	6263073,0	50230978,3	885152,8	190,67
16	72,05	118,61	0,00	0,00	0,0
QP1	702,1500	1402,216	112,64762	12,38407	19145,171
QP2	-12,409641	193,38911	-1172,7968	954,363	160,00418
QP3	12,46493	157,97515	3443,3873		
QP4	.4937822	1197,847	53749,913	177,50179	17124615
QP5	68,51344	48,11892	3534,690	18214,945	
QP6	1302,1883	1,8429415E+08		92,788	431,379
QP7	333,28547				

1	390,000	90,981	503,790	9097,3	10346,1
2	2,0360	155,8095	18514,384	17986,471	27,057
3	6,424	154,673	4,262	5,269	6,762
4	1,955	159,886	117,735	26,712	26,562
5	196,000	-6,444	0,00000	-,08178	0,00000
6	21464449,5	20911639,9	-1,7115	3,6434	43,5734
7	,00	0,00	2597810,3	-1750703,8	-322388,7
8	7,91	.000	14197,62	-10908,72	2018,59
9	28,291	30,4807	-2979446,6	966913,6	-322388,7
10	3108301,6	17528,8	-16616,03	6583,77	2018,59
11	6,060	162,204	11,951	136,103	131,576
12	0,0	0,0	-31,908	0,000	24098,850
13	346,266	38,202	4832,552	316,576	557,459
14	1,002	.631	0,000	0,000	23434,854
15	11661245,1	6263073,0	50230978,3	976048,2	190,67
16	72,05	118,62	0,00	0,00	0,0
QP1	710,6745	1441,096	112,42587	11,77360	19409,748
QP2	-12,055145	193,83378	-1190,8568	964,579	159,92566
QP3	11,85071	158,01297	3443,4478		
QP4	.4783318	1247,429	52397,770	177,77651	17229717
QP5	68,49884	48,88236	3539,033	18489,932	
QP6	1421,4101	1,8940441E+08		93,101	435,061
QP7	333,49790				

1	400,000	91,893	532,774	9112,8	10036,7
2	1,6631	155,8934	18791,449	18262,622	28,177
3	6,104	154,764	4,330	5,221	6,767
4	1,572	159,926	117,549	26,257	26,108
5	196,000	-7,311	0,00000	-1,08178	0,00000
6	21470461,5	20912083,2	-2,4886	-4,7712	-43,5434
7	,00	0,00	2739989,3	-1860587,0	-300678,5
8	7,98	.000	14338,95	-11068,72	2324,09
9	29,212	30,4637	-3146694,1	1033267,6	-300678,5
10	3284886,3	17789,8	-16834,43	6687,59	2324,09
11	5,358	161,994	11,872	135,126	132,643
12	0,0	0,0	-31,908	0,000	24386,338
13	346,266	38,202	4841,917	316,576	559,461
14	,002	.620	0,000	0,000	23722,342
15	11661245,1	6263073,0	50230978,3	1067098,6	190,68
16	72,06	118,62	0,00	0,00	0,0
QP1	719,5169	1481,740	112,19495	11,13536	19683,041
QP2	-11,687833	194,31219	-1210,2767	976,153	159,84731
QP3	11,20851	158,04993	3443,4981		
QP4	.4621180	1300,568	51033,979	178,06235	17338936
QP5	68.48399	49,70375	3539,319	18774,311	
QP6	1452,4313	1,9475611E+08		93,358	438,681
QP7	333.70644				

1	410,000	92,633	562,212	9128,3	9726,8
2	1,3140	155,9762	19079,869	18550,158	29,343
3	5,791	154,854	4,380	5,170	6,761
4	1,214	159,964	117,362	25,794	25,647
5	196,000	-8,161	0,00000	-1,08178	0,00000
6	21475372,1	20912528,0	-3,2643	-5,8976	-43,5023
7	,00	0,00	2884305,3	-1972094,7	-275894,1
8	8,07	.000	14525,08	-11233,68	2633,44
9	30,194	30,4499	-3316155,2	1100676,8	-275894,1
10	3464130,5	18060,8	-17058,82	6794,85	2633,44
11	4,675	161,802	11,819	134,124	133,728
12	0,0	0,0	-31,908	0,000	24683,299
13	346,266	38,202	4849,309	316,576	561,529
14	,002	.609	0,000	0,000	24019,303
15	11661245,1	6263073,0	50230978,3	1158303,9	190,69
16	72,06	118,63	0,00	0,00	0,0
QP1	728,7375	1524,411	111,95347	10,46517	19965,601
QP2	-11,307309	194,82997	-1231,1866	989,338	159,76892
QP3	10,53412	158,08598	3443,5481		
QP4	.4450871	1357,651	49657,840	178,36077	17452430
QP5	68.46888	50,58999	3538,552	19068,592	
QP6	1485,4753	2,0036744E+08		93,562	442,224
QP7	333.90991				

1	420,000	93,194	592,122	9143,8	9416,4
2	,9887	156,0579	19380,179	18849,610	30,562
3	5,486	154,943	4,413	5,117	6,742
4	,881	160,000	117,173	25,323	25,178
5	196,000	-8,995	0,00000	-1,08178	0,00000
6	21479227,8	20912974,2	-4,0381	-7,0222	-43,4503
7	,00	0,00	3030808,2	-2085278,4	-247995,7
8	0,18	,000	14716,40	-11403,98	2946,98
9	31,243	30,4390	-3487892,1	1169177,0	-247995,7
10	3646139,2	18342,8	-17289,67	6905,82	2946,98
11	4,007	161,623	11,792	133,103	134,826
12	0,0	0,0	-31,908	0,000	24990,399
13	346,266	38,202	4854,862	316,576	563,659
14	,002	,598	0,000	0,000	24326,403
15	11661245,1	6263073,0	50230978,3	1249664,3	190,69
16	72,06	118,63	0,00	0,00	0,0
GP1	738,4100	1569,439	111,69968	9,75783	20258,113
GP2	-10,912911	195,39428	-1253,7384	1004,450	159,69028
GP3	9,82232	158,12101	3443,5976		
GP4	.4271743	1419,139	48268,178	178,67365	17570408
GP5	68,45349	51,54937	3535,733	19373,423	
GP6	1520,8140	2,0626008E+08		93,715	445,667
GP7	334,10675				

1	430,000	93,589	622,523	9159,3	9105,5
2	,6876	156,1385	19692,997	19161,588	31,841
3	5,190	155,032	4,429	5,062	6,711
4	,573	160,034	116,982	24,845	24,702
5	196,000	-9,811	0,00000	-1,08178	0,00000
6	21482077,2	20913421,6	-4,8097	-8,1447	-43,3872
7	,00	0,00	3178662,2	-2200193,5	-216939,6
8	0,29	,000	14913,37	-11580,05	3265,04
9	32,364	30,4311	-3661972,1	1238806,5	-216939,6
10	3831024,5	19636,3	-17827,54	7020,77	3265,04
11	3,354	161,457	11,786	132,069	135,931
12	0,0	0,0	-31,908	0,000	25308,384
13	346,266	38,202	4858,712	316,576	565,848
14	,002	,587	0,000	0,000	24644,388
15	11661245,1	6263073,0	50230978,3	1341179,6	190,70
16	72,06	118,64	0,00	0,00	0,0
GP1	748,6264	1617,236	111,43141	9,00687	20561,340
GP2	-10,503773	196,01419	-1278,1031	1021,889	159,61110
GP3	9,06657	158,15489	3443,6465		
GP4	.4083071	1485,575	46863,661	179,00337	17693113
GP5	68,43783	52,59169	3535,864	19689,524	
GP6	1558,7720	2,1245841E+08		93,820	448,979
GP7	334,29490				

1	440,000	93.827	653,436	9174,8	8794,1
2	4109	156,2179	20018,946	19486,710	33,189
3	4,931	155,120	4,428	5,005	6,667
4	1,290	160,065	116,789	24,358	24,218
5	196,000	-10,610	0,00000	-0,08178	0,00000
6	21483972,0	20913870,1	-5,5785	-9,2647	-43,3132
7	0,00	0,00	3328795,9	-2316900,0	-182678,7
8	8,42	0,000	15116,43	-11762,31	3587,98
9	33,567	30,4259	-3838460,2	1309606,7	-182678,7
10	4018905,9	18942,1	-17772,97	7140,00	3587,98
11	2,713	161,302	11,802	131,026	137,040
12	0,0	0,0	-31,908	0,000	25638,001
13	346,266	38,202	4560,991	316,576	568,092
14	0,002	0,576	0,000	0,000	24974,005
15	11661245,1	6263073,0	50230978,3	1432849,9	190,71
16	72,07	118,64	0,00	0,00	0,0
GP1	759,5036	1668,318	111,14592	8,20413	20876,052
GP2	-10,078889	196,70116	-1304,4651	1042,162	159,53110
GP3	8,25866	158,18739	3443,6946		
GP4	.3884086	1557,580	45443,141	179,35300	,7820791
GP5	68,42187	53,72830	3539,950	20017,621	
GP6	1599,7293	2,1898822E+08		93,882	452,120
GP7	334,47164				

1	450,000	93,917	684,882	9187,1	8482,3
2	1588	156,2962	20358,621	19825,569	34,601
3	4,622	155,207	4,410	4,946	6,612
4	1,033	160,095	116,593	23,863	23,725
5	196,000	-11,393	0,00000	-0,08178	0,00000
6	21484967,1	20914319,6	-6,3442	-10,3818	-43,2282
7	0,00	0,00	3481002,5	-2435461,7	-145162,4
8	8,57	0,000	15326,01	-11951,16	3916,17
9	34,847	30,4232	-4017458,6	1381621,7	-145162,4
10	4209909,9	19260,9	-18026,49	7263,78	3916,17
11	2,084	161,156	11,835	129,979	138,148
12	0,0	0,0	-31,908	0,000	25979,966
13	346,266	38,202	4561,838	316,576	570,387
14	0,002	0,565	0,000	0,000	25315,970
15	11661245,1	6263073,0	50230978,3	1524661,9	190,72
16	72,07	118,65	0,00	0,00	0,0
GP1	771,1906	1723,338	110,83977	7,33929	21202,999
GP2	-9,637091	197,46992	-1333,0160	1065,912	159,44993
GP3	7,38821	158,21817	3443,7415		
GP4	.3673995	1635,858	44008,779	179,72652	,7953675
GP5	68,40563	54,97231	3535,994	20358,408	
GP6	1644,1321	2,2587620E+08		93,903	455,037
GP7	334,63336				

1	460,000	93,868	716,884	9198,9	8178,2
2	-1,0683	156,3734	20712,806	20178,942	36,097
3	4,352	135,294	4,375	4,884	6,543
4	-1,198	160,121	116,396	23,359	23,223
5	196,000	-12,159	0,00000	-1,08178	0,00000
6	21485120,7	20914769,8	-7,1064	-11,4955	-43,1324
7	1,30	0,00	3635339,6	-2555947,0	-104336,3
8	8,72	.000	15542,64	-12147,14	4250,05
9	36,225	30,4229	-4199027,2	1454898,6	-104336,3
10	4404170,5	19593,6	-18288,75	7392,44	4250,05
11	1,466	161,018	11,887	128,932	139,252
12	0,0	0,0	-31,908	0,000	26335,194
13	346,266	38,202	4861,388	316,576	572,726
14	1,002	.554	0,000	0,000	25671,198
15	11661245,1	6263073,0	50230978,3	1616592,2	190,73
16	72,07	118,65	0,00	0,00	0,0
QP1	783,8823	1783,156	110,50040	6,39879	21543,114
QP2	-9,176692	198,34035	-1363,9663	22720,676	159,36717
QP3	6,44156	158,24672	3443,7868		
QP4	.3451847	1721,271	42550,156	-179,87041	,8092077
QP5	68,38908	56,33982	3536,001	20712,764	
QP6	-1687,8486	2,33154335+08		93,890	3838,043
QP7	334,77479				

1	470,000	93,691	749,467	9210,7	7857,7
2	-1,2703	156,4493	21082,504	20547,826	37,692
3	4,091	155,380	4,324	4,821	6,463
4	-1,403	160,146	116,195	22,846	22,713
5	196,000	-12,908	0,00000	-1,08178	0,00000
6	21484494,5	20915220,6	-7,8646	-12,6056	-43,0259
7	1,00	0,00	3791881,3	-2678430,4	-60140,6
8	8,89	.000	15767,03	-12350,88	4590,16
9	37,714	30,4249	-4383265,7	1529488,4	-60140,6
10	4601831,5	19941,2	-18560,61	7526,44	4590,16
11	1,857	160,887	11,954	127,888	140,349
12	0,0	0,0	-31,908	0,000	26704,820
13	346,266	38,202	4859,780	316,576	575,105
14	1,002	.543	0,000	0,000	26040,824
15	11661245,1	6263073,0	50230978,3	1708640,1	190,74
16	72,08	118,66	0,00	0,00	0,0
QP1	797,8461	1848,951	110,14557	5,36406	21897,545
QP2	-8,695332	199,33995	-1397,5362	22754,402	159,28225
QP3	5,40000	158,27226	3443,8295		
QP4	.3216497	1814,876	41074,241	-179,42985	,8236390
QP5	68,37221	57,85078	3535,976	21081,775	
QP6	-1725,3823	2,4086105E+08		93,850	3930,906
QP7	334,88841				

1	480,000	93,396	782,656	9222,5	7544,8
2	=,4469	156,5240	21468,725	20933,228	39,397
3	3,841	155,465	4,297	4,756	6,370
4	=,1582	160,168	115,992	22,324	22,192
5	196,000	-13,641	0,00000	=,08178	0,00000
6	21483154,0	20915671,8	=8,6184	-13,7117	=42,9087
7	,00	0,00	3950708,9	=2802992,7	=12510,6
8	9,07	,000	15999,87	=12563,05	4937,01
9	39,328	30,4289	=4570274,3	1605446,7	=12510,6
10	4803047,2	20304,7	=18842,91	7666,22	4937,01
11	,258	160,763	12,037	126,851	141,435
12	0,0	0,0	=31,908	0,000	27089,981
13	346,266	38,202	4853,154	316,576	577,517
14	,002	,532	0,000	0,000	26425,984
15	11661245,1	6263073,0	50230978,3	1800805,8	190,75
16	72,08	118,67	0,00	0,00	0,0
QP1	813,4540	1922,345	109,74265	4,20949	22267,459
QP2	=8,190065	200,50726	=1433,9099	22795,254	159,19446
QP3	4,23776	158,29350	3443,8684		
QP4	,2966732	1917,918	39576,294	=178,94043	,8387015
QP5	68,35501	59,52906	3535,927	21466,524	
QP6	=1767,3640	2,49037265+08		93,791	4033,236
QP7	334,96326				

1	490,000	92,995	816,480	9222,4	7231,8
2	=,5975	156,5974	21872,371	21336,045	41,178
3	3,601	155,549	4,173	4,689	6,264
4	=,1734	160,187	115,786	21,791	21,662
5	196,000	-14,359	0,00000	=,08178	0,00000
6	21481170,0	20916123,2	=9,3676	-14,8133	=42,7808
7	,00	0,00	4111908,9	=2929721,4	38623,8
8	9,26	,000	16241,75	=12784,22	5291,13
9	41,030	30,4347	=4760161,2	1682833,3	38623,8
10	5007982,1	20685,2	=19136,38	7812,15	5291,13
11	=,1333	160,644	12,133	125,824	142,508
12	0,0	0,0	=31,908	0,000	27491,699
13	346,266	38,202	4853,647	316,576	579,957
14	,002	,521	0,000	0,000	26827,703
15	11661245,1	6263073,0	50230978,3	1893052,6	190,76
16	72,08	118,67	0,00	0,00	0,0
QP1	831,2343	2005,626	109,28744	2,89900	22653,925
QP2	=7,657216	201,89778	=1473,1632	22845,532	159,10287
QP3	2,91850	158,30831	3443,9012		
QP4	,2701344	2031,838	38055,301	=178,38501	,8544310
QP5	68,33748	61,40291	3535,866	21867,967	
QP6	=1814,3975	2,5772397E+08		93,726	4146,485
QP7	334,98270				

1	500,000	92,501	850,968	9220,1	6918,8
2	=,7221	156,6694	22294,452	21757,283	43,088
3	3,372	155,633	4,073	4,620	6,148
4	=,859	160,204	115,577	21,248	21,122
5	196,000	-15,060	0,00000	=,08178	0,00000
6	21478617,9	20916574,4	=10,1117	=15,9102	=42,6425
7	,00	0,00	4275975,9	=3058709,3	93338,2
8	9,47	,000	16493,34	=13015,03	5653,15
9	42,876	30,4422	=4953041,9	1761711,7	93338,2
10	5216810,4	21083,6	=19441,84	7964,67	5653,15
11	=,916	160,530	12,243	124,809	143,567
12	0,0	0,0	=31,908	0,000	27911,122
13	346,266	38,202	4849,403	316,576	582,416
14	,002	,510	0,000	0,000	27247,125
15	11661245,1	6263073,0	50230978,3	1985285,8	190,77
16	72,09	118,68	0,00	0,00	0,0
QP1	851,9694	2102,175	108,76180	1,37927	23058,135
QP2	=7,091639	203,59648	=1515,1565	22908,643	159,00620
QP3	1,38857	158,31300	3443,9242		
QP4	.2418990	2158,387	36510,123	=177,73559	,8708676
QP5	68,31960	63,50723	3535,807	22287,128	
QP6	-1867,1260	2,6696718E+08		93,675	4272,343
QP7	334.91922				

1	510,000	91,926	886,152	9289,0	6605,9
2	=,8204	156,7401	22736,334	22198,304	45,116
3	3,154	155,715	3,958	4,549	6,019
4	=,957	160,219	115,365	20,694	20,570
5	196,000	-15,746	0,00000	=,08178	0,00000
6	21475578,1	20917025,2	=10,8503	=17,0021	=42,4937
7	,00	0,00	4441811,1	=3190057,0	151715,7
8	9,69	,000	16755,53	=13256,32	6023,85
9	44,852	30,4510	=5149041,8	1842150,6	151715,7
10	5429718,5	21501,3	=19760,39	8124,35	6023,85
11	=1,492	160,421	12,365	123,807	144,608
12	0,0	0,0	=31,908	0,000	28349,752
13	346,266	38,202	4844,570	316,576	584,886
14	,002	,498	0,000	0,000	27685,755
15	11661245,1	6263073,0	50230978,3	2077452,0	190,78
16	72,09	118,69	0,00	0,00	0,0
QP1	876,9148	2217,392	108,13643	=,43478	23481,652
QP2	=6,485526	205,74253	=1559,2860	22990,047	158,90242
QP3	=,43771	158,30671	3443,9302		
QP4	.2118024	2299,789	34938,697	=176,94422	,8880656
QP5	68,30137	65,88692	3535,776	22725,320	
QP6	-1926,2008	2,7682347E+08		93,670	4412,809
QP7	334.72541				

1	520,000	91,286	922,064	9196,2	6293,6
2	-8919	156,8094	23199,396	22660,484	47,314
3	2,949	155,797	3,827	4,477	5,880
4	-1,027	160,231	119,149	20,128	20,007
5	196,000	-16,416	0,00000	-1,08178	0,00000
6	21472137,1	20917475,2	-11,5831	-18,0886	-42,3346
7	9,60	0,00	4610724,9	-3323873,7	213846,7
8	9,94	.000	17029,22	-13508,96	6403,99
9	47,013	30,4610	-5348297,0	1924224,4	213846,7
10	5646906,6	21939,8	-20093,11	8291,76	6403,99
11	-2,061	160,315	12,499	122,822	145,630
12	0,0	0,0	-31,908	0,000	28809,099
13	346,266	38,202	4838,287	316,576	587,360
14	1,002	.487	0,000	0,000	28145,103
15	11661245,1	6263073,0	50230978,3	2169499,0	190,79
16	72,10	118,70	0,00	0,00	0,0
GP1	908,2178	2360,449	107,36086	-2,68760	23926,109
GP2	-5,827201	208,58023	-1603,7937	23099,027	158,78821
GP3	-2,72569	158,25764	3443,9054		
GP4	.1796731	2458,755	33339,419	-175,92197	19060799
GP5	68,28277	68,59814	3538,819	23183,729	
GP6	-1992,0115	2,8735397E+08		93,768	4569,956
GP7	334,31288				

1	521,559	91,181	927,731	9194,2	6244,9
2	-9006	156,8201	23273,585	22734,533	47,673
3	2,918	155,810	3,806	4,465	5,857
4	-1,035	160,232	119,115	20,038	19,918
5	196,000	-16,519	0,00000	-1,08178	0,00000
6	21471570,5	20917545,3	-11,6968	-18,2575	-42,3089
7	9,00	0,00	4637307,6	-3344965,7	223877,4
8	9,98	.000	17072,98	-13549,43	6464,15
9	47,369	30,4626	-5379663,6	1937172,2	223877,4
10	5681105,6	22010,2	-20146,33	8318,59	6464,15
11	-2,149	160,298	12,520	122,670	145,788
12	0,0	0,0	-31,908	0,000	28882,676
13	346,266	38,202	4838,433	316,576	587,746
14	1,002	.485	0,000	0,000	28218,679
15	11661245,1	6263073,0	50230978,3	2183835,0	190,80
16	72,10	118,70	0,00	0,00	0,0
GP1	913,8917	2386,199	107,22117	-3,09313	23997,398
GP2	-5,718784	209,11069	-1610,5332	23119,453	158,76912
GP3	-3,11394	158,24654	3443,8971		
GP4	.1744698	2485,326	33087,510	-175,73199	19089654
GP5	68,27984	69,05504	3538,837	23257,080	
GP6	-2002,8659	2,8906057E+08		93,799	4596,076
GP7	334,21909				

1	521,559	94,181	927,731	9194,2	6244,9
2	-9,506	156,8201	23273,585	22734,533	47,675
3	2,918	155,810	3,806	4,465	5,857
4	-1,035	160,232	116,116	20,038	19,918
5	196,000	-16,519	0,00000	-1,08178	0,00000
6	21471570,5	20917545,3	-11,6968	-18,2575	-42,3089
7	1,60	0,00	4637307,6	-3344968,7	223877,4
8	9,98	.000	17072,98	-13549,43	6464,15
9	47,369	30,4626	-5379663,6	1937172,2	223877,4
10	5681165,6	22010,2	-20146,33	8318,59	6464,15
11	-2,149	160,298	12,520	122,670	145,788
12	0,0	0,0	-31,908	0,000	28882,676
13	346,266	38,202	4838,433	316,576	587,746
14	1,002	.485	0,000	0,000	28218,679
15	11661245,1	6263073,0	50230978,3	2183835,0	190,80
16	72,16	118,76	0,00	0,00	0,0
GP1	913,8917	2386,199	107,22117	-3,09313	23997,398
GP2	-5,718784	209,11069	-1610,5332	23119,453	158,76912
GP3	-3,11394	158,24654	3443,8971		
GP4	.1744698	2485,326	33087,510	-175,73199	1,9089654
GP5	68,27984	69,65504	3538,837	23257,080	
GP6	-2002,8659	2,8906057E+08		93,799	4596,076
GP7	334,21909				

1	530,600	96,585	958,742	9168,2	5881,8
2	-9,362	156,8772	23685,018	23145,198	49,637
3	2,757	155,878	3,681	4,402	5,729
4	-1,069	160,240	114,929	19,550	19,432
5	196,000	-17,071	0,00000	-1,08178	0,00000
6	21468388,3	20917924,2	-12,3099	-19,1695	-42,1654
7	1,60	0,00	4782436,8	-3460277,0	279829,6
8	10,21	.000	17315,29	-13773,80	6794,36
9	49,312	30,4719	-5550955,0	2008013,5	279829,6
10	5868589,3	22400,5	-20441,10	8467,48	6794,36
11	-2,623	160,212	12,643	121,854	146,633
12	0,0	0,0	-31,908	0,000	29290,671
13	346,266	38,202	4833,703	316,576	589,830
14	1,003	.476	0,000	0,000	28626,675
15	11661245,1	6263073,0	50230978,3	2261347,0	190,81
16	72,16	118,71	0,00	0,00	0,0
GP1	949,9401	2548,591	106,33792	-5,65039	24393,274
GP2	-5,097667	212,58942	-1644,0136	23253,057	158,65740
GP3	-5,68822	158,15223	3443,8184		
GP4	.1453405	2638,603	31711,379	-174,48163	1,9249656
GP5	68,26381	71,71190	3536,027	23663,206	
GP6	-2063,9537	2,9862355E+08		94,089	4745,311
GP7	333,49505				

1	540,000	89,870	996,222	9122,9	5671,3
2	=,9530	156,9435	24194,543	23653,787	52,090
3	2,578	155,957	3,521	4,326	5,569
4	=1,063	160,247	114,706	18,959	18,844
5	196,000	=17,711	0,00000	=,08178	0,00000
6	21464432,4	20918371,6	=13,0302	=20,2444	=41,9860
7	,00	0,00	4957074,9	=3599392,9	349771,0
8	10,49	,000	17614,58	=14051,61	7195,87
9	51,756	30,4834	=5757173,3	2093603,5	349771,0
10	6094994,8	22884,6	=20805,37	8652,04	7195,87
11	=3,180	160,112	12,798	120,904	147,615
12	0,0	0,0	=31,908	0,000	29795,954
13	346,266	38,202	4827,967	316,576	592,284
14	,003	,464	0,000	0,000	29131,957
15	11661245,1	6263073,0	50230978,3	2392828,0	190,83
16	72,11	118,72	0,00	0,00	0,0
QP1	1011,0552	2819,703	104,84504	=9,91735	24885,267
QP2	=4,261905	216,88852	=1666,7469	23490,529	158,49606
QP3	=9,98285	157,69720	3443,5867		
QP4	.1086620	2843,365	30055,093	=172,14866	,9447770
QP5	68,24447	75,31911	3536,628	24163,583	
QP6	=2137,8021	3,1070063E+08		94,931	4937,375
QP7	331,79799				

1	550,006	89,130	1034,545	9030,8	5362,9
2	=,9421	157,0082	24728,731	24187,010	54,510
3	2,413	156,036	3,345	4,249	5,400
4	=1,068	160,251	114,478	18,355	18,243
5	196,000	=18,337	0,00000	=,08178	0,00000
6	21460377,8	20918816,9	=13,7438	=21,3131	=41,7966
7	,00	0,00	8134774,0	=3741354,1	423786,7
8	10,79	,000	17927,46	=14342,81	7609,29
9	54,179	30,4951	=5967118,6	2181084,9	423786,7
10	6326363,2	23393,0	=21186,40	8845,72	7609,29
11	=3,731	160,015	12,962	119,974	148,574
12	0,0	0,0	=31,908	0,000	30325,841
13	346,266	38,202	4822,231	316,576	594,710
14	,003	,453	0,000	0,000	29661,844
15	11661245,1	6263073,0	50230978,3	2443665,6	190,84
16	72,12	118,73	0,00	0,00	0,0
QP1	1117,6636	3283,308	102,18216	=17,19636	25405,209
QP2	=3,240255	230,97046	=1625,3921	23922,372	158,25922
QP3	=17,34535	157,14968	3442,9170		
QP4	.0696805	3077,409	28377,183	=167,29418	,9655453
QP5	68,22481	79,53330	3538,402	24680,122	
QP6	=2193,3558	3,2364383E+08		97,342	5129,057
QP7	327,59353				

1	560,000	88.392	1073,751	8894,0	5058,5
2	-,9034	157,0714	25286,694	24744,182	56,883
3	2,263	156.113	3,156	4,170	5,223
4	-1,025	160.253	114,246	17,737	17,629
5	196,000	-18.949	0,00000	-,08178	0,00000
6	21456341,0	20919259,6	-14,4504	-22,3753	-41,5975
7	-,00	0,00	5315667,3	-3886291,8	501998,0
8	11,11	.000	18283,30	-14646,83	8035,05
9	56,570	30,5068	-6180954,5	2270547,0	501998,0
10	6562934,2	23925,1	-21583,41	9048,14	8035,05
11	-4,277	159.920	13,136	119,064	149,512
12	0,0	0,0	-31,908	0,000	30879,783
13	346,266	38,202	4816,646	316,576	597,089
14	,003	.441	0,000	0,000	30215,787
15	11661245,1	6263073,0	50230978,3	2533354,4	190,86
16	72,13	118,74	0,00	0,00	0,0
QP1	1423,4177	4580,643	92,86856	-37,22410	25968,376
QP2	-1,708845	270,67685	-1209,6918	25197,570	157,56358
QP3	-37,40965	152,20680	3439,6818		
QP4	.0298464	3341,182	26722,124	-149,01419	,9872462
QP5	68.20489	84,49078	3546,763	25173,233	
QP6	-2073,1095	3,3747887E+08		108,692	5167,833
QP7	309.97834				

1	561,000	88.320	1077,721	8879,7	5028,3
2	-,8980	157,0776	25344,012	24801,200	57,128
3	2,249	156.121	3,137	4,162	5,209
4	-1,020	160.253	114,223	17,675	17,566
5	196,000	-19.009	0,00000	-,08178	0,00000
6	21455943,1	20919303,8	-14,5207	-22,4812	-41,5770
7	-,00	0,00	5333937,2	-3900954,2	510054,6
8	11,14	.000	18286,58	-14677,92	8078,33
9	56,818	30,5080	-6202558,2	2279605,5	510054,6
10	6586886,5	23979,5	-21623,97	9068,86	8078,33
11	-4,331	159.911	13,154	118,974	149,604
12	0,0	0,0	-31,908	0,000	30936,489
13	346,266	38,202	4816,101	316,576	597,324
14	,003	.440	0,000	0,000	30272,493
15	11661245,1	6263073,0	50230978,3	2542243,3	190,87
16	72,13	118,74	0,00	0,00	0,0
QP1	1504,3456	4920,415	89,55368	-42,29730	26031,094
QP2	-1,462196	281,32042	-1073,5696	25537,828	157,32607
QP3	-42,48893	149,86666	3438,6869		
QP4	.0261659	3368,217	26567,066	-144,10010	,9894671
QP5	68.20288	85,03394	3549,217	25212,217	
QP6	-2016,9152	3,3891267E+08		111,959	5128,934
QP7	305.13157				

1	562,000	88,247	1081,701	8863,5	4998,2
2	=,8924	157,0839	25401,364	24858,452	57,364
3	2,234	156,129	3,117	4,154	5,187
4	=1,013	160,253	114,199	17,612	17,504
5	196,000	-19,073	0,00000	=,08178	0,00000
6	21455546,6	20919347,8	=14,5909	=22,5870	=41,5564
7	,30	0,00	5352240,4	=3915647,7	518154,7
8	11,17	.003	18319,98	=14709,13	8121,73
9	57,056	30,5092	=6224202,5	2288684,7	518154,7
10	6610893,3	24934,3	=21664,68	9089,65	8121,73
11	=4,385	159,901	13,172	118,884	149,696
12	0,0	0,0	=31,908	0,000	30993,431
13	346,266	38,202	4815,560	316,576	597,558
14	,003	,439	0,000	0,000	30329,434
15	11661245,1	6263073,0	50230978,3	2551115,8	190,87
16	72,13	118,74	0,00	0,00	0,0
GP1	1624,7336	5424,700	83,39773	=49,56742	26097,440
GP2	=1,154359	296,35884	=874,7872	26045,220	156,90004
GP3	=49,75736	145,06910	3437,2266		
GP4	.0227150	3394,780	26418,389	=137,60616	,9916970
GP5	68.20088	85,58651	3552,589	25244,861	
GP6	-1937,5208	3,40355725+08		116,329	5067,116
GP7	298.70510				

1	563,000	88,175	1085,690	8845,2	4968,1
2	=,8864	157,0901	25458,941	24915,927	57,588
3	2,221	156,136	3,097	4,147	5,169
4	=1,007	160,253	114,176	17,549	17,441
5	196,000	=19,130	0,00000	=,08178	0,00000
6	21455151,9	20919391,9	=14,6610	=22,6927	=41,5358
7	,30	0,00	5370877,2	=3930372,5	526298,1
8	11,20	.000	18353,50	=14740,46	8165,26
9	57,282	30,5103	=6245887,6	2297784,8	526298,1
10	6634955,1	24989,2	=21705,53	9110,53	8165,26
11	=4,439	159,892	13,190	118,795	149,788
12	0,0	0,0	=31,908	0,000	31050,600
13	346,266	38,202	4815,022	316,576	597,791
14	,003	,438	0,000	0,000	30386,603
15	11661245,1	6263073,0	50230978,3	2559970,2	190,87
16	72,13	118,74	0,00	0,00	0,0
GP1	1850,6828	6369,260	64,80963	=61,52923	26169,739
GP2	=,694844	321,16164	=537,6162	27002,187	155,76047
GP3	=61,69021	128,82539	3434,9978		
GP4	.0196346	3420,374	26279,695	=128,89418	,9939357
GP5	68.19887	86,14861	3557,380	25267,582	
GP6	-1825,2991	3,4180783E+08		122,243	4972,757
GP7	290.06075				

ACHIEVES ORBIT

1	564,030	88,103	1089,689	8826,8	4938,1
2	8802	157,0962	25516,741	24973,627	57,814
3	2,207	156,144	3,077	4,139	5,151
4	-1,030	160,253	114,152	17,486	17,379
5	196,000	-19,190	0,00000	8,08178	0,00000
6	21454758,9	20919435,9	-14,7310	-22,7984	-41,5151
7	30	0,00	5388947,5	-3945128,7	534485,2
8	11,23	0,000	18387,13	-14771,91	8208,91
9	57,511	30,5114	-6267613,6	2306905,8	534485,2
10	6659071,8	24144,4	-21746,53	9131,49	8208,91
11	-4,494	159,882	13,208	118,705	149,880
12	0,0	0,0	-31,908	0,000	31107,995
13	346,266	38,202	4814,488	316,576	598,024
14	1003	437	0,000	0,000	30443,999
15	11661245,1	6263073,0	50230978,3	2568806,2	190,87
16	72,13	118,74	0,00	0,00	0,0
GP4	.0171474	3444,210	26156,641	-117,25734	,9961832
GP5	68,19686	86,72048	3564,389	25274,726	
GP6	-1669,3736	3,4326903E+08		130,203	4834,988
GP7	278,49169				

1	565,000	88,031	1093,697	8808,4	4908,1
2	8737	157,1024	25574,769	25031,553	58,041
3	2,193	156,152	3,057	4,131	5,133
4	-993	160,253	114,129	17,423	17,316
5	196,000	-19,250	0,00000	8,08178	0,00000
6	21454367,9	20919479,8	-14,8010	-22,9040	-41,4942
7	30	0,00	5407351,5	-3959916,3	542716,0
8	11,27	0,000	18420,88	-14803,47	8252,69
9	57,741	30,5126	-6289380,17	2316047,8	542716,0
10	6683243,9	24199,7	-21787,68	9152,53	8252,69
11	-4,548	159,873	13,226	118,616	149,971
12	0,0	0,0	-31,908	0,000	31165,620
13	346,266	38,202	4813,957	316,576	598,256
14	1003	436	0,000	0,000	30501,624
15	11661245,1	6263073,0	50230978,3	2577623,9	190,87
16	72,13	118,74	0,00	0,00	0,0
GP4	.0155644	3465,171	26057,108	-102,43083	,9984395
GP5	68,19485	87,30235	3574,744	25258,411	
GP6	-1465,0029	3,4473943E+08		140,655	4649,073
GP7	263,73312				

1	566,690	87,960	1097,714	8790,1	4878,3
2	-8670	157,1086	25633,025	25089,708	58,271
3	2,180	156,159	3,037	4,123	5,114
4	-936	160,253	114,105	17,359	17,253
5	196,000	-19,310	0,00000	-0,08178	0,00000
6	21453979,0	20919523,8	-14,8709	-23,0095	-41,4733
7	,00	0,00	5425789,3	-3974735,6	550990,6
8	11,30	.000	18484,75	-14835,16	8296,60
9	57,974	30,5137	-6311189,0	2325210,9	550990,6
10	6707471,4	24255,4	-21828,97	9173,65	8296,60
11	-4,602	159,864	13,245	118,528	150,063
12	0,0	0,0	-31,908	0,000	31223,477
13	346,266	38,202	4813,430	316,576	598,487
14	,003	.435	0,000	0,000	30559,480
15	11661245,1	6263073,0	50230978,3	2586423,3	190,88
16	72,13	118,74	0,00	0,00	0,0
QP4	.0151963	3482,124	25988,887	-85,54384	1,0007047
QP5	68,19284	87,89450	3589,588	25210,843	
QP6	-1227,7301	3,4621912E+08		-154,092	4430,565
QP7	246.91423				

1	567,600	87,889	1101,740	8771,7	4848,4
2	-8599	157,1147	25691,512	25148,093	58,502
3	2,167	156,167	3,016	4,115	5,096
4	-978	160,253	114,081	17,296	17,190
5	196,000	-19,370	0,00000	-0,08178	0,00000
6	21453592,3	20919567,6	-14,9407	-23,1149	-41,4522
7	,00	0,00	5444261,0	-3989586,7	559309,2
8	11,33	.000	18488,75	-14866,96	8340,64
9	58,209	30,5148	-6333038,7	2334395,2	559309,2
10	6731754,7	24311,2	-21870,41	9194,85	8340,64
11	-4,656	159,855	13,263	118,439	150,154
12	0,0	0,0	-31,908	0,000	31281,567
13	346,266	38,202	4812,907	316,576	598,718
14	,003	.433	0,000	0,000	30617,570
15	11661245,1	6263073,0	50230978,3	2595204,2	190,88
16	72,13	118,75	0,00	0,00	0,0
QP4	.0161502	3494,636	25954,508	-69,18005	1,0029790
QP5	68,19083	88,49720	3609,367	25129,492	
QP6	-994,4696	3,4770820E+08		171,397	4216,886
QP7	230.61869				

1	568,000	87.819	1105,777	8753,3	4818,7
2	-8526	157,1208	25750,232	25206,711	58,736
3	2,154	156,174	2,996	4,107	5,078
4	-971	160,253	114,057	17,232	17,126
5	196,000	-19,429	0,00000	-1,08178	0,00000
6	21453207,9	20919611,5	-15,0105	-23,2203	-41,4311
7	,20	0,00	5462766,8	-4004469,6	567672,0
8	11,37	.000	18522,86	-14898,89	8384,82
9	58,446	30,5160	-6354929,9	2343600,6	567672,0
10	6756093,9	24367,3	-21912,01	9216,14	8384,82
11	-4,710	159,845	13,281	118,351	150,244
12	0,0	0,0	-31,908	0,000	31339,893
13	346,266	36,202	4812,387	316,576	598,947
14	,003	.432	0,000	0,000	30675,897
15	11661245,1	6263073,0	50230978,3	2603966,9	190,88
16	72,13	118,75	0,00	0,00	0,0
GP4	.0182412	3503,307	25949,025	-55,51238	1,0052624
GP5	68,18882	89,11072	3633,491	25019,301	
GP6	-799,675	3,4920677E+08		193,181	4040,389
GP7	217,01944				

1	569,000	87.749	1109,822	8735,0	4788,9
2	-8450	157,1269	25809,187	25265,564	58,971
3	2,141	156,182	2,975	4,099	5,059
4	-963	160,253	114,034	17,169	17,063
5	196,000	-19,489	0,00000	-1,08178	0,00000
6	21452826,0	20919655,3	-15,0802	-23,3256	-41,4099
7	.00	0,00	5481306,8	-4019384,5	576078,9
8	11,40	.000	18557,10	-14930,93	8429,12
9	58,685	30,5171	-6376862,8	2352827,5	576078,9
10	6780489,3	24423,6	-21953,75	9237,51	8429,12
11	-4,764	159,836	13,300	118,262	150,335
12	0,0	0,0	-31,908	0,000	31398,458
13	346,266	38,202	4811,873	316,576	599,176
14	,003	.431	0,000	0,000	30734,461
15	11661245,1	6263073,0	50230978,3	2,12711,1	190,88
16	72,13	118,75	0,00	0,00	0,0
GP4	.0211535	3509,219	25964,209	-45,04439	1,0074249
GP5	68,18680	89,73536	3660,892	24888,497	
GP6	-648,3100	3,5071493E+08		218,967	3909,371
GP7	206,62002				

1	570,000	87,679	1113,877	8716,6	4759,3
2	-8371	157,1330	25868,379	25324,654	59,209
3	2,128	156,190	2,954	4,091	5,041
4	-954	160,253	114,010	17,105	16,999
5	196,000	-19,548	0,00000	-8178	0,00000
6	21452446,7	20919699,1	-15,1498	-23,4309	-41,3886
7	0,00	0,00	5499881,1	-4034331,5	584530,3
8	11,43	0,000	18591,46	-14963,11	8473,56
9	58,926	30,5182	-6398837,5	362075,7	584530,3
10	6804941,1	24480,1	-21995,65	9258,96	8-73,56
11	-4,817	159,827	13,319	118,174	150,425
12	0,0	0,0	-31,908	0,000	31457,263
13	346,266	38,202	4811,362	316,576	599,405
14	0,003	0,430	0,000	0,000	30793,266
15	11661245,1	6263073,0	50230978,3	2621436,9	190,88
16	72,14	118,75	0,00	0,00	0,0
GP4	0246136	3513,319	25992,981	-37,24773	1,0098568
GP5	68,18479	90,37142	3690,634	24744,159	
GP6	-535,6827	3,5223277E+08		247,751	3816,825
GP7	198,89210				

1	571,000	87,610	1117,942	8698,2	4729,7
2	-8290	157,1391	25927,810	25383,982	59,449
3	2,115	156,197	2,934	4,083	5,022
4	-945	160,253	113,986	17,041	16,936
5	196,000	-19,607	0,00000	-8178	0,00000
6	21452070,2	20919742,8	-15,2193	-23,5361	-41,3671
7	0,00	0,00	5518489,8	-4049310,8	593026,1
8	11,47	0,000	18625,95	-14995,40	8518,13
9	59,170	30,5193	-6420854,1	2371345,4	593026,1
10	6829449,5	24536,9	-22037,70	9280,50	8518,13
11	-4,871	159,818	13,337	118,087	150,515
12	0,0	0,0	-31,908	0,000	31516,311
13	346,266	38,202	4810,856	316,576	599,632
14	0,003	0,429	0,000	0,000	30852,314
15	11661245,1	6263073,0	50230978,3	2630144,4	190,89
16	72,14	118,75	0,00	0,00	0,0
GP4	0284368	3516,251	26030,571	-31,41025	1,0121680
GP5	68,18277	91,01920	3722,086	24591,054	
GP6	-451,1892	3,5376041E+08		278,671	3752,765
GP7	193,12352				

1	572,000	87,541	1122,016	8679,8	4700,2
2	-8205	157,1452	25987,482	25443,552	59,691
3	2,133	156,205	2,913	4,075	5,003
4	-936	160,253	113,962	16,976	16,872
5	196,000	-19,666	0,00000	-1,08178	0,00000
6	21451696,5	20919786,5	-15,2687	-23,6412	-41,3456
7	.00	0,00	5537133,0	-4064322,4	601566,6
8	11,50	.000	18660,56	-15027,83	8562,84
9	59,416	30,5204	-6442912,9	2380636,7	601566,6
10	6854014,9	24593,9	-22079,91	9302,13	8562,84
11	-4,925	159,808	13,356	117,999	150,605
12	0,0	0,0	-31,908	0,000	31575,604
13	346,266	38,202	4810,355	316,576	599,859
14	.003	.423	0,000	0,000	30911,607
15	11661245,1	6263073,0	50230978,3	2638833,4	190,89
16	72,14	118,75	0,00	0,00	0,0
GP4	.0325083	3518,417	26074,016	-26,95717	1,0144886
GP5	68,18075	91,67903	3754,860	24432,145	
GP6	-386,6491	3,5529794E+08		311,160	3709,020
GP7	188,73950				

1	573,000	87,473	1126,100	8661,4	4670,7
2	-8118	157,1512	26047,398	25503,365	59,934
3	2,090	156,212	2,891	4,067	4,985
4	-927	160,253	113,938	16,912	16,808
5	196,000	-19,725	0,00000	-1,08178	0,00000
6	21451325,9	20919830,2	-15,3581	-23,7462	-41,3240
7	.00	0,00	5555810,9	-4079366,5	610151,8
8	11,53	.000	18695,30	-15060,38	8607,69
9	59,664	30,5214	-6465014,0	2389949,7	610151,8
10	6878637,4	24651,1	-22122,28	9323,84	8607,69
11	-4,979	159,799	13,375	117,912	150,695
12	0,0	0,0	-31,908	0,000	31635,144
13	346,266	38,202	4809,859	316,576	600,085
14	.003	.426	0,000	0,000	30971,148
15	11661245,1	6263073,0	50230978,3	2647504,1	190,89
16	72,14	118,75	0,00	0,00	0,0
GP4	.0367575	3520,067	26121,491	-23,48377	1,0168188
GP5	68,17873	92,35124	3788,720	24269,253	
GP6	-336,2642	3,5684546E+08		344,875	3679,801
GP7	185,33531				

1	574,000	87,405	1130,194	8642,9	4641,3
2	8028	157,1572	26107,560	25563,423	60,180
3	2,078	156,220	2,870	4,059	4,966
4	918	160,253	113,914	16,847	16,744
5	196,000	-19,784	0,00000	8178	0,00000
6	21450958,5	20919873,8	-15,4274	-23,8512	-41,3023
7	00	0,00	5574823,6	-4094443,2	618782,0
8	11,57	000	18730,17	-15093,06	8652,67
9	59,914	30,5225	-6487157,5	2399284,4	618782,0
10	6903317,2	24708,6	-22164,81	9345,64	8652,67
11	-5,032	159,790	13,394	117,825	150,784
12	0,0	0,0	-31,908	0,000	31694,934
13	346,266	38,202	4808,367	316,576	600,310
14	003	.425	0,000	0,000	31030,938
15	11661245,1	6263073,0	50230978,3	2656156,3	190,89
16	72,14	118,76	0,00	0,00	0,0
GP4	.0411401	3521,355	26171,054	-20,71502	1,0191587
GP5	68.17671	93,03617	3823,524	24103,521	
GP6	-296,0793	3,5840308E+08		379,614	3661,164
GP7	182.63594				

1	575,000	87,338	1134,297	8624,5	4611,9
2	7936	157,1632	26167,969	25623,729	60,428
3	2,066	156,227	2,849	4,052	4,947
4	908	160,252	113,890	16,783	16,679
5	196,000	-19,843	0,00000	8178	0,00000
6	21450594,4	20919917,3	-15,4966	-23,9561	-41,2805
7	00	0,00	5593271,3	-4109552,6	627457,2
8	11,60	000	18765,18	-15125,87	8697,80
9	60,167	30,5236	-6509343,7	2408641,0	627457,2
10	6928054,7	24766,3	-22207,50	9367,54	8697,80
11	-5,086	159,781	13,413	117,738	150,874
12	0,0	0,0	-31,908	0,000	31754,976
13	346,266	38,202	4808,881	316,576	600,535
14	003	.424	0,000	0,000	31090,980
15	11661245,1	6263073,0	50230978,3	2664790,1	190,90
16	72,14	118,76	0,00	0,00	0,0
GP4	.0456275	3522,384	26224,366	-18,46386	1,0215082
GP5	68.17468	93,73418	3859,187	23935,686	
GP6	-263,3971	3,5997090E+08		415,256	3650,423
GP7	180.45433				

1	576,080	87,272	1138,411	8606,0	4582,7
2	7840	157,1692	26228,628	25684,284	60,679
3	2,054	156,235	2,827	4,044	4,929
4	1,828	160,252	113,866	16,718	16,615
5	196,000	19,902	0,00000	0,08178	0,00000
6	21450233,7	20919960,9	15,5658	24,0609	41,2586
7	0,00	0,00	5612054,0	4124695,0	636177,6
8	11,63	0,000	18800,31	15158,81	8743,06
9	60,422	30,5246	6531572,6	2418019,5	636177,6
10	6952850,0	24824,3	22250,35	9389,52	8743,06
11	5,140	159,772	13,432	117,651	150,962
12	0,0	0,0	31,908	0,000	31815,272
13	346,266	38,202	4808,400	316,576	600,758
14	1,003	423	0,000	0,000	31151,275
15	11661245,1	6263073,0	50230978,3	2673405,4	190,90
16	72,14	118,76	0,00	0,00	0,0
QP4	0502009	3523,220	26278,533	16,60114	1,0238675
QP5	68,17266	94,44564	3895,655	23766,241	
QP6	236,3519	3,6154903E+08		451,729	3645,721
QP7	178,66131				

1	577,000	87,206	1142,534	8587,6	4553,4
2	7742	157,1752	26289,539	25745,091	60,931
3	2,043	156,242	2,806	4,036	4,910
4	1,887	160,252	113,841	16,653	16,550
5	196,000	19,960	0,00000	0,08178	0,00000
6	21449876,6	20920004,3	15,6349	24,1657	41,2366
7	0,00	0,00	5630872,0	4139870,3	644943,4
8	11,67	0,000	18835,58	15191,89	8788,47
9	60,679	30,5257	6553844,4	2427420,1	644943,4
10	6977703,4	24882,6	22293,37	9411,59	8788,47
11	5,193	159,763	13,451	117,564	151,051
12	0,0	0,0	31,908	0,000	31875,824
13	346,266	38,202	4807,925	316,576	600,982
14	1,003	422	0,000	0,000	31211,828
15	11661245,1	6263073,0	50230978,3	2682002,3	190,90
16	72,14	118,76	0,00	0,00	0,0
QP4	0548472	3523,911	26334,017	15,03588	1,0262367
QP5	68,17063	95,17092	3932,897	23595,920	
QP6	213,6275	3,6313758E+08		488,990	3645,755
QP7	177,16592				

1	578,000	87,144	1146,667	8569,1	4524,3
2	-,7641	157,1811	26350,704	25806,152	61,186
3	2,031	156,249	2,784	4,028	4,891
4	-,877	160,252	113,817	16,588	16,485
5	196,000	20,018	0,00000	-,08178	0,00000
6	21449523,3	20920047,8	15,7038	-24,2704	41,2145
7	-,00	0,00	5649725,2	-4155078,8	653754,6
8	11,70	0,00	18870,98	-15225,10	8834,02
9	60,939	30,5267	-6576159,4	2436842,7	653754,6
10	7002615,2	24941,0	-22336,56	9433,76	8834,02
11	-5,247	159,753	13,471	117,478	151,140
12	0,0	0,0	-31,908	0,000	31936,635
13	346,266	38,202	4807,455	316,576	601,204
14	1003	421	0,000	0,000	31272,639
15	11661245,1	6263073,0	50230978,3	2690580,8	190,90
16	72,14	118,76	0,00	0,00	0,0
GP4	.0595575	3524,490	26390,582	-13,70267	1,0286158
GP5	68.16860	95,91043	3970,897	23423,763	
GP6	-194,2765	3,6473664E+08		527,017	3649,590
GP7	175.90275				

1	579,000	87,076	1150,809	8550,7	4495,2
2	-,7537	157,1871	26412,125	25867,468	61,443
3	2,020	156,257	2,762	4,020	4,872
4	-,866	160,252	113,793	16,522	16,420
5	196,000	20,077	0,00000	-,08178	0,00000
6	21449173,9	20920091,1	15,7728	-24,3750	41,1923
7	-,00	0,00	5668614,0	-4170320,5	662611,5
8	11,73	0,00	18906,52	-15258,44	8879,71
9	61,201	30,5277	-6598517,6	2446287,6	662611,5
10	7027585,5	24999,8	-22379,94	9456,01	8879,71
11	-5,300	159,744	13,490	117,392	151,228
12	0,0	0,0	-31,908	0,000	31997,707
13	346,266	38,202	4806,991	316,576	601,425
14	1003	419	0,000	0,000	31333,711
15	11661245,1	6263073,0	50230978,3	2699140,8	190,91
16	72,14	118,76	0,00	0,00	0,0
GP4	.0643253	3524,98	26448,054	-12,55351	1,0310051
GP5	68.16657	96,66459	4009,647	23251,138	
GP6	-177,6033	3,6634632E+08		565,797	3656,541
GP7	174.82380				

1	580,000	87.012	1154,262	8532,2	4466,2
2	7,7430	157,1930	26473,805	25929,043	61,703
3	2,009	156,264	2,740	4,012	4,853
4	854	160,251	113,768	16,457	16,355
5	196,000	-20,135	0,00000	0,08178	0,00000
6	21448823,5	20920134,5	-15,8416	-24,4795	-41,1701
7	0,00	0,00	5687538,3	-4185595,7	671514,1
8	11,77	0,000	18942,20	-15291,92	8925,55
9	61,466	30,5287	-6620919,3	2455754,8	671514,1
10	7052614,8	25058,7	-22423,43	9478,36	8925,55
11	-5,353	159,735	13,509	117,306	151,316
12	0,0	0,0	-31,908	0,000	32059,042
13	346,266	38,202	4806,533	316,576	601,646
14	0,004	.418	0,000	0,000	31395,046
15	11661245,1	6263073,0	50230978,3	2707682,3	190,91
16	72,15	118,76	0,00	0,00	0,0
QP4	.0691459	3525,398	26506,307	-11,55255	1,0334044
QP5	68,16454	97,43380	4049,147	23077,772	
QP6	-163,8873	3,6796674E+08		605,329	3666,101
QP7	173.89320				

1	581,000	86,949	1159,125	8513,8	4437,2
2	7,7321	157,1989	26535,745	25990,878	61,965
3	1,998	156,272	2,718	4,004	4,834
4	843	160,251	113,744	16,391	16,290
5	196,000	-20,193	0,00000	0,08178	0,00000
6	21448487,3	20920177,7	-15,9104	-24,5840	-41,1477
7	0,00	0,00	5706498,4	-4200904,4	680462,6
8	11,80	0,000	18978,01	-15325,54	8971,54
9	61,733	30,5297	-6643364,5	2465244,4	680462,6
10	7077783,1	25118,6	-22467,13	9580,81	8971,54
11	-5,407	159,726	13,529	117,221	151,403
12	0,0	0,0	-31,908	0,000	32120,643
13	346,266	38,202	4806,081	316,576	601,866
14	0,004	.417	0,000	0,000	31456,646
15	11661245,1	6263073,0	50230978,3	2716205,4	190,91
16	72,15	118,76	0,00	0,00	0,0
QP4	.0740158	3525,759	26565,247	-10,67248	1,0358140
QP5	68,16251	98,21852	4089,401	22903,758	
QP6	-150,3327	3,6959801E+08		645,615	3677,888
QP7	173.08368				

1	582,000	66,886	1163,297	8493,9	4408,3
2	-7209	157,2048	26597,945	26052,973	62,219
3	1,987	156,279	2,696	3,996	4,815
4	-831	160,251	113,720	16,326	16,225
5	196,000	-20,251	0,00000	-0,08178	0,00000
6	21448150,5	20920221,0	-15,9790	-24,6884	-41,1252
7	0,00	0,00	5725494,4	-4216246,8	689457,2
8	11,84	0,000	19013,96	-15359,30	9017,68
9	61,993	30,5307	-6665853,6	2474756,4	689457,2
10	7102850,9	25177,5	-22510,99	9523,35	9017,68
11	-5,460	159,717	13,548	117,135	151,491
12	0,0	0,0	-31,908	0,000	32182,508
13	346,266	38,282	4805,635	316,576	602,085
14	0,004	.416	0,000	0,000	31518,512
15	11661245,1	6263073,0	50230978,3	2724709,6	190,91
16	72,15	118,77	0,00	0,00	0,0
QP4	.0789323	3526,072	26624,799	-9,89228	1,0382338
QP5	68.16047	99.01918	4130,417	22729,174	
QP6	-139,0336	3,7124016E+08		686,662	3691,609
QP7	172.37418				

1	583,000	86,824	1167,480	8472,1	4379,5
2	-7093	157,2107	26660,389	26115,311	62,461
3	1,976	156,286	2,674	3,988	4,796
4	-819	160,250	113,695	16,260	16,159
5	196,000	-20,308	0,00000	-0,08178	0,00000
6	21447818,1	20920264,1	-16,0476	-24,7927	-41,1027
7	0,00	0,00	5744826,4	-4231623,1	698498,0
8	11,87	0,000	19050,04	-15393,18	9063,95
9	62,240	30,5317	-6688386,6	2484291,1	698498,0
10	7128058,2	25237,2	-22555,01	9545,97	9063,95
11	-5,513	159,708	13,568	117,050	151,578
12	0,0	0,0	-31,908	0,000	32244,624
13	346,266	38,202	4805,195	316,576	602,304
14	0,004	.415	0,000	0,000	31580,627
15	11661245,1	6263073,0	50230978,3	2733192,6	190,92
16	72,15	118,77	0,00	0,00	0,0
QP4	.0838921	3526,346	26684,889	-9,19558	1,0406632
QP5	68.15844	99.83601	4172,192	22554,126	
QP6	-128,9526	3,7289283E+08		728,467	3707,033
QP7	171.74835				

1	584,000	86.763	1171,673	8450,3	4350,7
2	-.6976	157,2165	26723,076	26177,893	62,705
3	1,966	156.294	2,651	3,980	4,777
4	-.836	160,250	113,670	16,194	16,093
5	196,000	-.20.366	0,00000	-.08178	0,00000
6	21447490,4	20920307,3	-16,1162	-24,8970	-41,0800
7	.00	0,00	5763594,5	-4247033,3	707585,2
8	11,91	.000	19086,25	-15427,19	9110,37
9	62,491	30,5326	-6710963,7	2493848,4	707585,2
10	7153325,4	25297,2	-22599,19	9568,69	9110,37
11	-5,566	159.699	13,588	116,965	151,665
12	0,0	0,0	-31,908	0,000	32306,987
13	346,266	38.202	4804,762	316,576	602,521
14	.004	.414	0,000	0,000	31642,991
15	11661245,1	6263073,0	50230978,3	2741653,8	190,92
16	72,15	118,77	0,00	0,00	0,0
GP4	.0880933	3526.586	26745,470	-8,56925	1,0431022
GP5	68.15640	100.66944	4214,738	22378,665	
GP6	-119,8987	3,74556035+08		771,041	3723,982
GP7	171.19306				

1	584,000	86.703	1175,876	8428,5	4322,0
2	-.6855	157,2223	26786,009	26240,719	62,952
3	1,956	156.301	2,629	3,972	4,758
4	-.794	160,250	113,646	16,127	16,027
5	196,000	-.20.424	0,00000	-.08178	0,00000
6	21447167,5	20920350,3	-16,1846	-25,0012	-41,0573
7	.00	0,00	5782698,9	-4262477,5	716718,8
8	11,94	.000	19122,58	-15461,33	9156,94
9	62,743	30,5336	-6733585,0	2503428,5	716718,8
10	7178652,7	25357,4	-22643,52	9591,49	9156,94
11	-5,620	159.690	13,008	116,860	151,752
12	0,0	0,0	-31,908	0,000	32369,602
13	346,266	38.202	4804,336	316,576	602,738
14	.004	.412	0,000	0,000	31705,606
15	11661245,1	6263073,0	50230978,3	2750093,1	190,92
16	72,15	118,77	0,00	0,00	0,0
GP4	.0939348	3526.798	26806,508	-8,00271	1,0455508
GP5	68.15436	101.51999	4258,068	22202,825	
GP6	-111,7181	3,7622988E+08		814,398	3742,318
GP7	170.69774				

1	586,000	86,644	1100,089	8406,7	4293,4
2	-.6731	157,2281	26849,189	26303,793	63,201
3	1,945	156,309	2,606	3,964	4,739
4	-.781	160,249	113,621	16,061	15,961
5	196,000	-20,481	0,00000	-.08178	0,00000
6	21446849,5	20920393,4	-16,2530	-25,1053	-41,0344
7	.00	0,00	5801839,7	-4277956,0	725899,1
8	11,98	.000	19159,04	-15495,60	9203,65
9	62,998	30,5345	-6756250,6	2513031,4	725899,1
10	7204040,3	25417,9	-22688,02	9614,38	9203,65
11	-5,673	159,681	13,628	116,796	151,839
12	0,0	0,0	-31,908	0,000	32432,470
13	346,266	38,202	4803,916	316,576	602,954
14	.004	.411	0,000	0,000	31768,474
15	11661245,1	6263073,0	50230978,3	2758510,7	190,92
16	72,15	118,77	0,00	0,00	0,0
QP4	.0990159	3526,986	26867,976	-7,48739	1,0480092
QP5	68.15232	102,38816	4302,200	22026,631	
QP6	-104,2858	3,7791450E+08		858,556	3761,931
QP7	170.25381				

1	587,000	86,585	1184,313	8384,9	4264,9
2	-.6605	157,2339	26912,620	26367,117	63,452
3	1,935	156,316	2,583	3,956	4,720
4	-.768	160,249	113,596	15,994	15,895
5	196,000	-20,538	0,00000	-.08178	0,00000
6	21446536,7	20920436,3	-16,3213	-25,2093	-41,0115
7	.00	0,00	5821017,1	-4293468,7	735126,2
8	12,81	.000	19195,63	-15529,99	9250,51
9	63,255	30,5354	-6778961,1	2522657,3	735126,2
10	7229488,6	25478,6	-22732,67	9637,35	9250,51
11	-5,726	159,672	13,648	116,711	151,925
12	0,0	0,0	-31,908	0,000	32495,594
13	346,266	38,202	4803,503	316,576	603,169
14	.004	.410	0,000	0,000	31831,598
15	11661245,1	6263073,0	50230978,3	2766906,5	190,93
16	72,15	118,77	0,00	0,00	0,0
QP4	.1041360	3527,153	26929,851	-7,01625	1,0504774
QP5	68.15028	103,27451	4347,152	21850,103	
QP6	-97,4998	3,7960999E+08		903,531	3782,735
QP7	169.85422				

1	588,000	86,527	1188,546	8363,1	4236,4
2	=,6476	157,2397	26976,303	26430,693	63,705
3	1,926	156,323	2,560	3,948	4,701
4	=,754	160,249	113,572	15,928	15,829
5	196,000	=20,596	0,00000	=,08178	0,00000
6	21446229,1	20920479,2	=16,3895	=25,3133	=40,9885
7	,00	0,00	5840231,0	=4309016,0	744400,2
8	12,04	,000	19232,36	=15564,52	9297,51
9	63,515	30,5363	=6801716,2	2532306,2	744400,2
10	7254897,7	25539,6	=22777,49	9660,42	9297,51
11	=5,779	159,663	13,668	116,627	152,011
12	0,0	0,0	=31,908	0,000	32558,977
13	346,266	38,202	4803,098	316,576	603,383
14	,004	,409	0,000	0,000	31894,980
15	11661245,1	6263073,0	50230978,3	2775280,5	190,93
16	72,16	118,77	0,00	0,00	0,0
QP4	.1092946	3527,302	26992,116	=6,58348	1,0529556
QP5	68,14824	104,17959	4392,942	21673,256	
QP6	=91,2753	3,81316485+08		949,343	3804,663
QP7	169,49318				

1	580,000	86,471	1192,790	8341,3	4208,0
2	=,6344	157,2455	27040,241	26494,524	63,961
3	1,916	156,330	2,537	3,940	4,682
4	=,740	160,248	113,547	15,861	15,762
5	196,000	=20,653	0,00000	=,08178	0,00000
6	21445926,9	20920522,1	=16,4576	=25,4172	=40,9653
7	,00	0,00	5859481,8	=4324597,8	753721,2
8	12,08	,000	19269,21	=15599,18	9344,67
9	63,777	30,5372	=6824816,1	2541978,2	753721,2
10	7280567,8	25600,0	=22822,47	9683,58	9344,67
11	=5,832	159,654	13,688	116,543	152,097
12	0,0	0,0	=31,908	0,000	32622,621
13	346,266	38,202	4802,700	316,576	603,596
14	,004	,408	0,000	0,000	31958,624
15	11661245,1	6263073,0	50230978,3	2783632,7	190,93
16	72,16	118,78	0,00	0,00	0,0
QP4	.1144914	3527,436	27054,757	=6,18424	1,0554438
QP5	68,14620	105,10400	4439,591	21496,102	
QP6	=85,5418	3,8303409E+08		996,014	3827,662
QP7	169,16584				

1	590,000	86,415	1197,045	8319,5	4179,7
2	-6210	157,2512	27104,436	26558,612	64,218
3	1,907	156,338	2,514	3,932	4,663
4	-726	160,248	113,522	15,794	15,696
5	196,000	-20,710	0,00000	-0,08178	0,00000
6	21445630,3	20920564,9	-16,5257	-25,5210	-40,9421
7	,00	0,00	5878769,5	-4340214,4	763089,5
8	12,11	.000	19306,20	-15633,97	9391,98
9	64,041	30,5380	-6847361,2	2551673,4	763089,5
10	7306199,3	25662,3	-22867,62	9706,83	9391,98
11	-5,885	159,645	13,708	116,460	152,182
12	0,0	0,0	-31,908	0,000	32686,528
13	346,266	38,262	4802,309	316,576	603,808
14	,004	.407	0,000	0,000	32022,532
15	11661245,1	6263073,0	50230978,3	2791963,1	190,94
16	72,16	118,78	0,00	0,00	0,0
GP4	.1197262	3527,555	27117,762	-5,81445	1,0579422
GP5	68,14415	106,04835	4487,122	21318,652	
GP6	-80,2462	3,84762935+08		1043,564	3851,691
GP7	168,86813				

1	591,000	86,360	1201,309	8297,7	4151,4
2	-6072	157,2569	27168,891	26622,960	64,479
3	1,897	156,345	2,491	3,924	4,643
4	-712	160,247	113,497	15,726	15,629
5	196,000	-20,766	0,00000	-0,08178	0,00000
6	21445339,5	20920607,6	-16,5936	-25,6248	-40,9188
7	,00	0,00	5898094,3	-4355865,8	772505,2
8	12,15	.000	19343,33	-15668,90	9439,44
9	64,308	30,5389	-6870251,4	2561391,8	772505,2
10	7331892,4	25724,0	-22912,84	9730,17	9439,44
11	-5,938	159,636	13,728	116,376	152,268
12	0,0	0,0	-31,908	0,000	32750,702
13	346,266	38,202	4801,926	316,576	604,020
14	,004	.405	0,000	0,000	32086,706
15	11661245,1	6263073,0	50230978,3	2800271,7	190,94
16	72,16	118,78	0,00	0,00	0,0
GP4	.1249990	3527,663	27181,122	-5,47068	1,0604508
GP5	68,14211	107,01326	4538,558	21140,914	
GP6	-75,3202	3,8650313E+08		1092,017	3876,718
GP7	168,59660				

1	592,000	86.306	1205,584	8275,9	4123,2
2	5,5932	157,2626	27233,609	26687,570	64,741
3	1,888	156,352	2,467	3,916	4,624
4	5,697	160,247	113,472	15,659	15,562
5	196,000	20.823	0,00000	0,08178	0,00000
6	21445054,5	20920650,3	16,6615	25,7285	40,8954
7	40	0,00	5017456,2	4371552,2	781968,5
8	12,19	0,000	19380,59	15703,97	9487,06
9	64,578	30,5397	6893187,1	2571133,7	781968,5
10	7357647,4	25786,0	22958,42	9753,61	9487,06
11	5,990	159,627	13,749	116,293	152,353
12	0,0	0,0	31,908	0,000	32815,145
13	346,266	38,202	4801,551	316,576	604,230
14	1004	404	0,000	0,000	32151,148
15	11661245,1	6263073,0	50230978,3	2808558,5	190,94
16	72,16	118,78	0,00	0,00	0,0
QP4	1383098	3527,759	27244,829	5,15000	1,0629698
QP5	68,14006	107,99941	4584,921	20962,992	
QP6	70,7392	3,8825488E+08		1141,398	3902,721
QP7	168,34834				

1	593,000	86.253	1209,870	8254,1	4095,1
2	5,5789	157,2683	27298,591	26752,444	65,006
3	1,879	156,359	2,444	3,908	4,605
4	5,682	160,246	113,447	15,591	15,494
5	196,000	20.880	0,00000	0,08178	0,00000
6	21444775,7	20920692,9	16,7294	25,8321	40,8719
7	0,00	0,00	5036885,5	4387273,8	791479,4
8	12,23	0,000	19418,00	15739,18	9534,83
9	64,850	30,5405	6916168,13	2580899,1	791479,4
10	7383464,5	25848,2	23004,08	9777,14	9534,83
11	6,043	159,619	13,769	116,210	152,438
12	0,0	0,0	31,908	0,000	32879,859
13	346,266	38,202	4801,183	316,576	604,440
14	1004	403	0,000	0,000	32215,863
15	11661245,1	6263073,0	50230978,3	2816823,5	190,94
16	72,16	118,78	0,00	0,00	0,0
QP4	1356585	3527,847	27308,877	4,84989	1,0654992
QP5	68,13801	109,00748	4635,238	20784,591	
QP6	66,4667	3,9001807E+08		1191,731	3929,685
QP7	168,12062				

1	594,000	86,201	1214,166	8232,3	4067,1
2	-,5643	157,2740	27363,840	26817,585	65,274
3	1,870	156,366	2,420	3,900	4,586
4	-,1667	160,246	113,422	15,524	15,427
5	196,000	-20,936	0,00000	-,08178	0,00000
6	21444503,0	20920735,5	-,16,7971	-,25,9356	-,40,8483
7	-,00	0,00	5956292,3	-,4403030,6	801038,2
8	12,26	.000	19455,54	-,15774,52	9582,76
9	65,125	30,5413	-,6939195,3	2590688,1	801038,2
10	7409343,9	25910,7	-,23049,91	9800,77	9582,76
11	-,6,096	159,610	13,790	116,127	152,522
12	0,0	0,0	-,31,908	0,000	32944,848
13	346,266	38,202	4800,824	316,576	604,649
14	1004	.402	0,000	0,000	32280,851
15	11661245,1	6263073,0	50230978,3	2825066,8	190,95
16	72,16	118,78	0,00	0,00	0,0
GP4	.1410452	3527,925	27373,262	-,4,56818	1,0650392
GP5	68,13597	110,03819	4686,536	20606,016	
GP6	-,62,4530	3,9179386E+08		1243,043	3957,599
GP7	167,01190				

1	595,000	86,150	1218,472	8210,5	4039,1
2	-,5494	157,2796	27429,359	26882,995	65,544
3	1,862	156,374	2,397	3,892	4,567
4	-,1651	160,245	113,397	15,456	15,360
5	196,000	-20,993	0,00000	-,08178	0,00000
6	21444236,7	20920777,9	-,16,8647	-,26,0391	-,40,8247
7	-,00	0,00	5975766,6	-,4418822,9	810645,0
8	12,30	.000	19493,22	-,15810,01	9630,84
9	65,402	30,5421	-,6962268,2	2600500,7	810645,0
10	7435286,0	25973,5	-,23095,92	9824,50	9630,84
11	-,6,149	159,601	13,810	116,045	152,607
12	0,0	0,0	-,31,908	0,000	33010,112
13	346,266	38,202	4800,473	316,576	604,857
14	1004	.401	0,000	0,000	32346,116
15	11661245,1	6263073,0	50230978,3	2833288,2	190,95
16	72,16	118,78	0,00	0,00	0,0
GP4	.1464701	3527,996	27437,979	-,4,30302	1,0705898
GP5	68,13392	111,09228	4738,841	20427,168	
GP6	-,58,6891	3,9357990E+08		1295,362	3986,458
GP7	167,71968				

1	596,020	86.101	1222,790	8188,7	4011,2
2	-5343	157,2853	27495,149	26948,676	65,816
3	1,853	156,381	2,373	3,804	4,548
4	-1,635	160,245	113,372	15,388	15,292
5	196,000	-21,049	0,00000	-1,08178	0,00000
6	21443977,0	20920820,4	-16,9323	-26,1424	-40,8009
7	,00	0,00	5995278,8	-4434650,7	820299,9
8	12,34	.000	19531,05	-15845,64	9679,09
9	65,682	30,5429	-6985387,2	2610337,1	820299,9
10	7461291,0	26036,5	-23142,10	9848,32	9679,09
11	-6,201	159,592	13,631	115,962	152,691
12	0,0	0,0	-31,908	0,000	33075,657
13	346,266	38,202	4800,130	316,576	605,064
14	,004	.400	0,000	0,000	32411,660
15	11661245,1	6263073,0	50230978,3	2841487,8	190,95
16	72,17	118,79	0,00	0,00	0,0
QP4	.1519333	3528,061	27503,025	-4,05277	1,0731512
QP5	68.13186	112.17055	4792,182	20248,048	
QP6	-55,1450	3,9537871E+08		1348,717	4016,262
QP7	167.54256				

1	597,000	86.052	1227,117	8166,9	3983,4
2	-5188	157,2909	27561,214	27014,632	66,091
3	1,845	156,388	2,349	3,876	4,528
4	-1,619	160,244	113,346	15,319	15,224
5	196,000	-21,105	0,00000	-1,08178	0,00000
6	21443724,0	20920862,7	-16,9998	-26,2456	-40,7770
7	,00	0,00	6014828,8	-4450514,2	830003,2
8	12,38	.000	19569,02	-15881,42	9727,50
9	65,965	30,5436	-7008552,5	2620197,4	830003,2
10	7487359,2	26099,6	-23188,47	9872,25	9727,50
11	-6,254	159,563	13,852	115,880	152,775
12	0,0	0,0	-31,908	0,000	33141,482
13	346,266	38,202	4799,795	316,576	605,271
14	,004	.398	0,000	0,000	32477,486
15	11661245,1	6263073,0	50230978,3	2849665,6	190,96
16	72,17	118,79	0,00	0,00	0,0
QP4	.1574350	3528,119	27568,398	-3,81600	1,0757234
QP5	68.12981	113.27380	4846,591	20068,658	
QP6	-51,8001	3,9718962E+08		1403,137	4047,014
QP7	167.37909				

1	598,000	86,005	1231,456	8145,1	3955,6
2	=,5031	157,2965	27627,556	27080,864	66,369
3	1,837	156,395	2,325	3,868	4,509
4	=,603	160,243	113,321	15,251	15,156
5	196,000	=21,161	0,00000	=,08178	0,00000
6	21443478,0	20920905,0	=17,0672	=26,3490	=40,7531
7	,00	0,00	6034416,9	=4466413,6	839755,0
8	12,42	.000	19607,14	=15917,34	9776,07
9	66,251	30,5444	=7031764,2	2630081,6	839755,0
10	7513490,8	26163,4	=23285,01	9896,27	9776,07
11	=6,307	159,574	13,073	115,798	152,858
12	0,0	0,0	=31,908	0,000	33207,593
13	346,266	38,202	4799,476	316,576	605,476
14	,004	.397	0,000	0,000	32543,596
15	11661245,1	6263073,0	50230978,3	2857821,7	190,96
16	72,17	118,79	0,00	0,00	0,0
GP4	.1629754	3528,171	27634,096	=3,59146	1,0783066
GP5	68,12776	114,40289	4902,098	19888,999	
GP6	=48,0361	3,9901274E+08		1458,656	4078,723
GP7	167,22804				

1	599,000	85,958	1235,805	8123,3	3927,9
2	=,4871	157,3020	27694,177	27147,376	66,649
3	1,829	156,402	2,301	3,860	4,490
4	=,586	160,243	113,296	15,183	15,088
5	196,000	=21,217	0,00000	=,08178	0,00000
6	21443238,9	20920947,2	=17,1345	=26,4521	=40,7290
7	,00	0,00	6054043,1	=4482349,0	849555,4
8	12,45	.000	19645,41	=15953,41	9824,80
9	66,539	30,5451	=7055022,6	2639989,9	849555,4
10	7539686,1	26227,3	=23281,73	9920,39	9824,80
11	=6,359	159,565	13,093	115,716	152,942
12	0,0	0,0	=31,908	0,000	33273,990
13	346,266	38,202	4799,153	316,576	605,681
14	,004	.396	0,000	0,000	32609,993
15	11661245,1	6263073,0	50230978,3	2865955,9	190,96
16	72,17	118,79	0,00	0,00	0,0
GP4	.1685549	3528,219	27700,119	=3,37805	1,0809008
GP5	68,12570	115,55871	4958,736	19709,069	
GP6	=45,0369	4,0084822E+08		1515,304	4111,398
GP7	167,08830				

1	600,000	85,913	1240,165	8101,5	3900,3
2	-1,4708	157,3076	27761,080	27214,168	66,933
3	1,822	156,409	2,276	3,852	4,471
4	-1,569	160,242	113,270	15,114	15,020
5	196,000	-21,273	0,00000	-1,06178	0,00000
6	2144307,2	20920989,4	-17,2018	-26,5552	-40,7049
7	0,00	0,00	6073707,7	-4498320,5	859404,6
8	12,49	0,000	19683,83	-15989,62	9873,70
9	66,831	30,5457	-7078327,8	2649922,4	859404,6
10	7565945,5	26291,4	-23328,64	9944,61	9873,70
11	-6,412	159,557	13,914	115,635	153,025
12	0,0	0,0	-31,908	0,000	33340,676
13	346,266	38,262	4798,545	316,576	605,885
14	0,004	0,395	0,000	0,000	32676,680
15	11661245,1	6263073,0	50230978,3	2874068,3	190,96
16	72,17	118,79	0,00	0,00	0,0
GP4	.1741735	3528,262	27766,464	-3,17480	1,0835061
GP5	68,12365	116,74218	5016,540	19528,869	
GP6	-42,7884	4,0269618E+08		1573,118	4145,054
GP7	166,95889				

1	601,000	85,869	1244,536	8079,7	3872,8
2	-1,4542	157,3131	27828,266	27281,245	67,218
3	1,814	156,416	2,252	3,844	4,452
4	-1,552	160,241	113,245	15,045	14,951
5	196,000	-21,329	0,00000	-1,08178	0,00000
6	21442782,8	20921031,5	-17,2689	-26,6582	-40,6807
7	0,00	0,00	6093410,8	-4514328,3	869302,8
8	12,53	0,000	19722,39	-16025,99	9922,77
9	67,125	30,5464	-7101679,9	2659879,2	869302,8
10	7592269,1	26355,8	-23375,74	9968,94	9922,77
11	-6,464	159,548	13,935	115,554	153,108
12	0,0	0,0	-31,908	0,000	33407,655
13	346,266	38,202	4798,546	316,576	606,088
14	0,004	0,394	0,000	0,000	32743,658
15	11661245,1	6263073,0	50230978,3	2882159,0	190,97
16	72,17	118,79	0,00	0,00	0,0
GP4	.1798317	3528,300	27833,132	-2,98084	1,0861227
GP5	68,12159	117,95427	5075,544	19348,398	
GP6	-40,0779	4,0455674E+08		1632,131	4179,706
GP7	166,83895				

1	602,060	85.827	1248,917	6058,9	3845,3
2	-4374	157,3186	27895,741	27348,609	67,515
3	1,807	156.423	2,228	3,836	4,432
4	-534	160,241	113,219	14,976	14,882
5	196,000	-21.385	0,00000	-1,08178	0,00000
6	21442566,0	20921073,5	-17,3360	-26,7612	-40,6563
7	0,00	0,00	6113152,6	-4530372,5	879250,2
8	12,57	0,000	19761,11	-16062,51	9972,00
9	67,430	30,5470	-7125079,3	2669860,3	879250,2
10	7618657,2	26426,5	-23423,03	9993,37	9972,00
11	-6,517	159.539	13,957	115,472	153,191
12	0,0	0,0	-31,908	0,000	33474,930
13	346,266	38,202	4798,257	316,576	606,290
14	0,004	0,392	0,000	0,000	32810,934
15	11661245,1	6263073,0	50230978,3	2890228,0	190,97
16	72,18	118,80	0,00	0,00	0,0
QP4	.1855298	3528,335	27900,124	-2,79538	1,0887507
QP5	68.11953	119.19603	5135,788	19167,650	
QP6	-37,4940	4,0643009E+08		1692,384	4215,375
QP7	166.72770				

1	603,090	85.785	1253,310	8039,3	3817,9
2	-4202	157,3241	27963,522	27416,279	67,825
3	1,800	156.430	2,203	3,828	4,413
4	-516	160,240	113,194	14,907	14,813
5	196,000	-21.440	0,00000	-1,08178	0,00000
6	21442357,0	20921115,4	-17,4030	-26,8640	-40,6319
7	0,00	0,00	6132933,1	-4546453,3	889246,9
8	12,60	0,000	19799,99	-16099,19	10021,41
9	67,749	30,5477	-7148526,0	2679866,0	889246,9
10	7645410,3	26485,5	-23470,51	10017,92	10021,41
11	-6,569	159.539	13,978	115,392	153,273
12	0,0	0,0	-31,908	0,000	33542,519
13	346,266	38,202	4797,977	316,576	606,491
14	0,004	0,391	0,000	0,000	32878,522
15	11661245,1	6263073,0	50230978,3	2898277,1	190,97
16	72,18	118,80	0,00	0,00	0,0
QP4	.1912694	3528,367	27967,456	-2,61773	1,0913908
QP5	68.11747	120.46881	5197,325	18986,584	
QP6	-35,0266	4,0831678E+08		1753,929	4252,091
QP7	166.62444				

1	604,000	85.745	1257,713	8019,7	3790,5
2	-.4028	157,3295	28031,614	27484,259	68,138
3	1,793	156,437	2,178	3,820	4,394
4	-.498	160,239	113,168	14,837	14,744
5	196,000	-21,495	0,00000	-.08178	0,00000
6	21442155,9	20921157,3	-17,4699	-26,9668	=40,6074
7	.00	0,00	6152752,6	-4562570,9	899293,1
8	12,64	.000	19839,05	-16136,04	10071,00
9	68,071	30,5482	-7172020,4	2689896,2	899293,1
10	7671628,4	26550,9	-23518,21	10042,57	10071,00
11	-6,621	159,521	13,999	115,311	153,355
12	0,0	0,0	-31,908	0,000	33610,428
13	346,266	38,202	4797,707	316,576	606,691
14	.004	.390	0,000	0,000	32946,431
15	11661245,1	6263073,0	50230978,3	2906306,6	190,98
16	72,18	118,80	0,00	0,00	0,0
GP4	.1970512	3526,395	28035,130	-2,44727	1,0940433
GP5	68,11540	121,77380	5260,198	18805,189	
GP6	-32,6665	4,1021704E+08		1816,809	4289,881
GP7	166,52855				

1	605,000	85.707	1262,127	8000,0	3763,3
2	-.3851	157,3350	28100,021	27552,555	68,455
3	1,786	156,444	2,154	3,812	4,375
4	-.480	160,239	113,142	14,768	14,675
5	196,000	-21,551	0,00000	-.08178	0,00000
6	21441962,9	20921199,1	-17,5368	-27,0695	=40,5828
7	.00	0,00	6172611,2	-4578725,5	909389,0
8	12,68	.000	19878,27	-16173,06	10120,76
9	68,396	30,5482	-7195562,5	2699951,2	909389,0
10	7698212,1	26616,3	-23866,12	10067,35	10120,76
11	-6,674	159,513	14,020	115,231	153,437
12	0,0	0,0	-31,908	0,000	33678,660
13	346,266	38,202	4797,446	316,576	606,891
14	.004	.389	0,000	0,000	33014,664
15	11661245,1	6263073,0	50230978,3	2914316,5	190,98
16	72,18	118,80	0,00	0,00	0,0
GP4	.2028756	3528,421	28103,150	-2,28344	1,0967082
GP5	68,11334	123,11223	5324,453	18623,461	
GP6	-30,4058	4,1213104E+08		1881,071	4328,773
GP7	166,43948				

1	606,000	85,676	1266,553	7980,4	3736,1
2	=,3671	157,3404	28168,747	27621,169	68,775
3	1,779	156,451	2,129	3,804	4,356
4	=,461	160,238	113,116	14,698	14,606
5	196,000	=21,606	0,00000	=,08178	0,00000
6	21441778,2	20921240,8	=17,6035	=27,1722	=40,5581
7	,00	0,00	6192509,2	=4594917,1	919534,7
8	12,72	.000	19917,67	=16210,25	10170,71
9	68,725	30,5494	=7219152,7	2710030,9	919534,7
10	7724861,5	26682,4	=23614,24	10092,24	10170,71
11	=6,726	159,504	14,042	115,150	153,519
12	0,0	0,0	=31,908	0,000	33747,221
13	346,266	38,202	4797,195	316,576	607,090
14	,004	.388	0,000	0,000	33083,224
15	11661245,1	6263073,0	50230978,3	2922306,7	190,98
16	72,18	118,80	0,00	0,00	0,0
GP4	.2087430	3528,443	28171,517	=2,12575	1,0993857
GP5	68,11127	124,48535	5390,135	18441,396	
GP6	=28,2372	4,1405895E+08		1946,760	4368,798
GP7	166,35673				

1	607,000	85,634	1270,989	7960,8	3708,9
2	=,3488	157,3458	28237,796	27690,105	69,098
3	1,773	156,458	2,104	3,796	4,337
4	=,442	160,237	113,091	14,628	14,536
5	196,000	=21,661	0,00000	=,08178	0,00000
6	21441602,0	20921282,5	=17,6702	=27,2747	=40,5334
7	,00	0,00	6212446,6	=4611146,0	929730,4
8	12,75	.000	19957,24	=16247,61	10220,84
9	69,058	30,5499	=7242791,1	2720135,7	929730,4
10	7751577,0	26748,7	=23662,58	10117,25	10220,84
11	=6,778	159,495	14,063	115,070	153,601
12	0,0	0,0	=31,908	0,000	33816,112
13	346,266	38,202	4796,955	316,576	607,288
14	,004	.386	0,000	0,000	33152,116
15	11661245,1	6263073,0	50230978,3	2930277,3	190,99
16	72,18	118,80	0,00	0,00	0,0
GP4	.2146540	3528,464	28240,233	=1,97374	1,1020761
GP5	68,10920	125,89450	5457,292	18258,989	
GP6	=26,1542	4,1600094E+08		2013,923	4409,989
GP7	166,27985				

1	608,000	85,599	1275,437	7941,2	3681,8
2	-.3332	157,3512	28307,169	27759,366	69,425
3	1,767	156,465	2,079	3,787	4,317
4	-.422	160,236	113,065	14,558	14,467
5	194,000	-21,716	0,00000	-.08178	0,00000
6	21441434,5	20921324,0	-17,7368	-27,3772	-40,5085
7	.90	0,00	6232423,7	-4627412,4	939976,4
8	12,79	.000	19996,99	-16285,15	10271,16
9	69,394	30,5504	-7266477,9	2730265,5	939976,4
10	7778358,9	26815,2	-23711,13	10142,37	10271,16
11	-6,830	159,486	14,085	114,991	153,682
12	0,0	0,0	-31,908	0,000	33885,338
13	346,266	38,202	4796,724	316,576	607,485
14	1,004	.385	0,000	0,000	33221,342
15	11661245,1	6263073,0	50230978,3	2938228,3	190,99
16	72,18	118,81	0,00	0,00	0,0
GP4	.2206089	3528,482	28309,300	-1,82701	1,1047793
GP5	68,10713	127,34108	5525,976	18076,237	
GP6	-24,1507	4,1795718E+08		2082,613	4452,383
GP7	166,20844				

1	609,000	85,566	1279,896	7921,5	3654,8
2	-.3113	157,3565	28376,872	27828,956	69,755
3	1,761	156,472	2,053	3,779	4,298
4	-.403	160,235	113,039	14,487	14,397
5	196,000	-21,771	0,00000	-.08178	0,00000
6	21441275,9	20921365,5	-17,8033	-27,4796	-40,4835
7	.90	0,00	6252440,7	-4643716,4	950272,8
8	12,83	.000	20036,92	-16322,87	10321,67
9	69,734	30,5509	-7290213,4	2740420,5	950272,8
10	7805207,6	26882,1	-23759,91	10167,62	10321,67
11	-6,882	159,478	14,106	114,911	153,763
12	0,0	0,0	-31,908	0,000	33954,902
13	346,266	38,202	4796,504	316,576	607,682
14	1,004	.384	0,000	0,000	33290,906
15	11661245,1	6263073,0	50230975,3	2946159,7	190,99
16	72,19	118,81	0,00	0,00	0,0
GP4	.2266083	3528,498	28378,721	-1,68519	1,1074956
GP5	68,10506	128,82655	5596,239	17893,136	
GP6	-22,2215	4,1992784E+08		2152,881	4496,018
GP7	166,14212				

1	618,000	95.535	1284,366	7961,9	3627,9
2	-.2921	157,3619	28446,908	27898,878	70,089
3	1,755	156,479	2,028	3,771	4,279
4	-.383	160,234	113,013	14,417	14,327
5	196,000	-21.826	0,00000	-.08178	0,00000
6	21441126,2	20921406,9	-17,8697	-27,5820	-40,4585
7	.00	0,00	6272497,6	-4660058,2	960619,8
8	12,87	.002	20077,03	-16360,76	10372,36
9	70,078	30,5513	-7313997,8	2750600,8	960619,8
10	7832123,3	26949,3	-23808,01	10192,99	10372,36
11	-.61934	159,469	14,128	114,832	153,844
12	0,0	0,0	-31,908	0,000	34024,809
13	346,266	38,202	4796,295	316,576	607,878
14	.004	.383	0,000	0,000	33360,812
15	11661245,1	6263073,0	50230978,3	2954071,4	191,00
16	72,10	118,81	0,00	0,00	0,0
GP4	.2326525	3528,512	28448,497	-1,54794	1,1102251
GP5	68.10298	130.35243	5668,136	17709,680	
GP6	-20,3615	4,21913106+08		2224,783	4540,935
GP7	166.08056				

SECOND ENGINE CUT OFF COMMAND

1	611,087	95.502	1289,238	7880,6	3598,7
2	-.2710	157,3676	28523,418	27975,264	70,456
3	1,748	156,487	2,000	3,763	4,259
4	-.361	160,233	112,985	14,340	14,250
5	196,000	-21.885	0,00000	-.08178	0,00000
6	21440974,1	20921451,8	-17,9418	-27,6931	-40,4312
7	.00	0,00	6294345,2	-4677864,8	971924,6
8	12,91	.000	20120,84	-16402,16	10427,68
9	70,456	30,5518	-7339907,2	2761693,6	971924,6
10	7861457,1	27022,8	-23862,44	10220,71	10427,68
11	-.61991	159,466	14,152	114,746	153,931
12	0,0	0,0	-31,908	0,000	34101,189
13	346,266	38,202	4796,079	316,576	608,090
14	.004	.382	0,000	0,000	33437,193
15	11661245,1	6263073,0	50230978,3	2962649,2	191,00
16	72,19	118,81	0,00	0,00	0,0
GP4	.2392742	3528,526	28524,751	-1,40357	1,1132071
GP5	68.10072	132,05887	5748,210	17509,857	
GP6	-18,4131	4,2408784E+08		2304,862	4591,266
GP7	166.01868				

1	611,432	85,493	1290,787	7873,8	3589,4
2	-.2642	157,3694	28547,785	27999,591	70,573
3	1,747	156,489	1,992	3,760	4,252
4	-.354	160,233	112,976	14,316	14,226
5	196,000	-21,904	0,00000	-.08178	0,00000
6	21440928,1	20921466,1	-17,9647	-27,7284	-40,4225
7	.00	0,00	6301289,2	-4683525,8	975525,2
8	12,92	.000	20134,79	-16415,34	10445,29
9	70,577	30,5519	-7348142,7	2765223,3	975525,2
10	7870784,0	27046,2	-23879,48	10229,54	10445,29
11	-7,009	159,457	14,159	114,718	153,959
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4796,013	316,576	608,157
14	.004	.381	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,00
16	72,19	118,81	0,00	0,00	0,0
QP4	.2413871	3528,530	28549,042	-1,35875	1,1141569
QP5	68,10000	132,61121	5774,054	17446,347	
QP6	-17,8099	4,2478176E+08		2330,708	4607,578
QP7	166,00008				

SECOND ENGINE CUTOFF, END STAGE II PITCH PROGRAM

1	611,432	85,493	1290,787	0,0	3589,4
2	-.2642	157,3694	28547,785	27999,591	.191
3	1,747	156,489	1,992	3,760	4,252
4	-.354	160,233	112,976	14,316	14,226
5	196,000	-21,904	0,00000	0,00000	0,00000
6	21440928,1	20921466,1	-17,9647	-27,7284	-40,4225
7	.00	0,00	6301289,2	-4683525,8	975525,2
8	12,92	.000	20134,79	-16415,34	10445,29
9	0,000	30,5519	-7348142,7	2765223,3	975525,2
10	7870784,0	27046,2	-23879,48	10229,54	10445,29
11	-7,009	159,457	14,159	114,718	153,959
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4796,013	316,576	608,157
14	.004	.381	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,00
16	72,19	118,81	0,00	0,00	0,0
QP4	.2413871	3528,530	28549,042	-1,35875	1,1141569
QP5	68,10000	132,61121	5774,054	17446,347	
QP6	-17,8099	4,2478176E+08		2330,708	4607,578
QP7	166,00008				

1	620,000	85,294	1329,277	0,0	3589,4
2	-1,378	157,4319	28548,882	28000,922	,120
3	2,400	156,551	2,517	3,773	4,531
4	-1,222	160,304	112,753	13,709	13,623
5	196,000	-22,416	0,00000	0,00000	0,00000
6	21440070,1	20921812,7	-17,9647	-27,7284	-40,4225
7	,00	0,00	6473807,1	-4823907,7	1066016,9
8	12,95	,000	20065,08	-16353,31	10677,71
9	0,000	30,5545	-7552383,6	2852697,4	1066016,9
10	8102491,5	27040,2	-23795,38	10189,12	10677,71
11	-7,449	159,384	13,716	115,219	153,434
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4794,699	316,576	608,157
14	,004	,371	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,03
16	72,21	118,83	0,00	0,00	0,0
QP4	,2414027	3528,529	28549,224	-7,0849	1,1141775
QP5	68,10014	132,61525	5774,244	17445,881	
QP6	-9,2863	4,2478682E+08		2330,897	4607,744
QP7	166,00350				

1	620,000	85,294	1329,277	0,0	3573,3
2	-1,378	157,4319	28548,882	28000,922	,120
3	2,400	156,551	2,517	3,773	4,531
4	-1,222	160,304	112,753	13,709	13,623
5	196,000	-22,416	0,00000	0,00000	0,00000
6	21440070,1	20921812,7	-17,9647	-27,7284	-40,4225
7	,00	0,00	6473807,1	-4823907,7	1066016,9
8	12,95	,000	20065,08	-16353,31	10677,71
9	0,000	30,5545	-7552383,6	2852697,4	1066016,9
10	8102491,5	27040,2	-23795,38	10189,12	10677,71
11	-7,449	159,384	13,716	115,219	153,434
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4794,699	316,576	608,157
14	,004	,371	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,03
16	72,21	118,83	0,00	0,00	0,0
QP4	,2414027	3528,529	28549,224	-7,0849	1,1141775
QP5	68,10014	132,61525	5774,244	17445,881	
QP6	-9,2863	4,2478682E+08		2330,897	4607,744
QP7	166,00350				

PERIGEE OF FINAL ORBIT

1	630,000	85.178	1374,206	0,0	3573,3
2	,0098	157,5010	28549,422	28001,711	,038
3	3,153	156.619	3,129	3,789	4,908
4	-1,067	160,383	118,494	13,000	12,918
5	196,000	-23.014	0,00000	0,00000	0,00000
6	21439751,2	20922199,9	-17,9647	-27,7284	-40,4225
7	,00	0,00	6673739,5	-4987071,3	1174144,9
8	12,97	,000	19980,90	-16279,08	10947,65
9	0,000	30,5556	-7789833,3	2954348,7	1174144,9
10	8372847,9	27030,6	-23694,00	10140,97	10947,65
11	-7,950	159,306	13,214	115,843	152,782
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4793,928	316,576	608,157
14	,005	,359	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,07
16	72,22	118,84	0,00	0,00	0,0
GP4	.2414199	3528,529	28549,423	,05036	1,1141902
GP5	68.10030	132,61975	5774,455	17445,364	
GP6	,6631	4,2479245E+08		2331,108	4607,932
GP7	166.00761				

1	650,000	85.318	1464,070	0,0	3573,3
2	,3049	157,6273	28548,102	28000,816	,127
3	4,689	156.744	4,355	3,820	5,784
4	1,241	160,528	111,982	11,581	11,507
5	196,000	-24.211	0,00000	0,00000	0,00000
6	21441319,2	20922917,0	-17,9647	-27,7284	-40,4225
7	,00	0,00	7071603,6	-5311122,9	1398461,2
8	12,95	,000	19803,51	-16124,80	11482,93
9	0,000	30,5514	-8261605,6	3156180,9	1398461,2
10	8913206,8	27003,6	-23480,95	10041,57	11482,93
11	-8,916	159,164	12,256	117,234	151,334
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4794,857	316,576	608,157
14	,006	,336	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,14
16	72,25	118,89	0,00	0,00	0,0
GP4	.2414512	3528,530	28549,776	1,56766	1,1141795
GP5	68.10060	132,62802	5774,840	17444,424	
GP6	20,5473	4,2480280E+08		2331,492	4608,293
GP7	166.01619				

1	660,030	85.574	1508,999	0,0	3573,3
2	.4523	157,6847	28546,244	27999,133	-.209
3	5,451	156.800	4,968	3,836	6,265
4	.396	160.594	111,728	10,871	10,802
5	196,010	-24.809	0,00000	0,00000	0,00000
6	21443205,6	20923246,4	-17,9647	-27,7284	-40,4225
7	.00	0,00	7269175,3	-5471972,4	1514617,9
8	12,91	.000	19710,33	-16044,79	11748,14
9	0,000	30,5461	-8495859,8	3256341,2	1514617,9
10	9183158,7	26986,4	-23369,33	9990,34	11748,14
11	-9,382	159.100	11,798	118,007	150,532
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	4796,555	316,576	608,157
14	.006	.324	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,18
16	72,27	118.91	0,00	0,00	0,0
QP4	.2414651	3528.532	28549,929	2,32601	1,1141560
QP5	68.10073	132.63178	5775,014	17444,001	
QP6	30,4895	4,2480750E+08		2331,666	4608,464
QP7	166.02064				

BEGIN COAST PHASE YAW PROGRAM

1	660,000	85.574	1508,999	0,0	3573,3
2	.4523	157,6847	28546,244	27999,133	-.209
3	5,451	156.800	4,968	3,836	6,265
4	.396	160.594	111,728	10,871	10,802
5	196,000	-24.809	0,00000	0,00000	-.88295
6	21443205,6	20923246,4	-17,9647	-27,7284	-40,4225
7	.00	0,00	7269175,3	-5471972,4	1514617,9
8	12,91	.000	19710,33	-16044,79	11748,14
9	0,000	30,5461	-8495859,8	3256341,2	1514617,9
10	9183158,7	26986,4	-23369,33	9990,34	11748,14
11	-9,382	159.100	11,798	118,007	150,532
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	4796,555	316,576	608,157
14	.006	.324	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,18
16	72,27	118.91	0,00	0,00	0,0
QP4	.2414651	3528.532	28549,929	2,32601	1,1141560
QP5	68.10073	132.63178	5775,014	17444,001	
QP6	30,4895	4,2480750E+08		2331,666	4608,464
QP7	166.02064				

1	670,000	85.955	1553,920	0,0	3573,3
2	,5997	157,7381	28543,587	27996,626	-,292
3	6,188	147,970	5,706	12,682	13,832
4	,550	160,656	111,476	10,161	10,096
5	196,000	-25,407	0,00000	0,00000	-,88295
6	21445826,4	20923556,0	-20,8637	-31,8462	48,7544
7	,00	0,00	7465800,4	-5632012,4	1633418,4
8	12,84	.000	19614,21	-15962,90	12011,66
9	0,000	30,5337	-8728981,0	3355984,3	1633418,4
10	9452327,2	25906,9	-23254,36	9938,11	12011,66
11	-9,839	159,039	17,400	144,785	122,952
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4799,077	316,576	608,157
14	,013	-.649	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,23
16	72,28	118,95	0,00	0,00	0,0
QP4	.2414779	3528,535	28550,067	3,08411	1,1141204
QP5	68,10086	132,63528	5775,175	17443,610	
QP6	40,4299	4,2481189E+08		2331,927	4608,629
QP7	166,02519				

1	690,000	87,087	1643,727	0,0	3573,3
2	,8942	157,8337	28535,882	27989,147	-,456
3	7,051	130,239	7,858	30,372	31,051
4	,859	160,767	110,975	8,741	8,685
5	196,000	-26,602	0,00000	0,00000	-,88295
6	21453268,2	20924114,9	-33,1901	-46,4343	64,6011
7	,00	0,00	7856093,8	-5949580,1	1878880,3
8	12,70	.000	19413,20	-15793,54	12533,32
9	0,000	30,5176	-9191691,1	3553679,1	1878880,3
10	9991824,6	26921,4	-23014,46	9830,72	12533,32
11	-10,727	158,929	33,011	163,286	103,012
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4806,283	316,576	608,157
14	,026	-3,211	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,51
16	72,30	119,21	0,00	0,00	0,0
QP4	.2415001	3528,542	28550,291	4,59940	1,1140129
QP5	68,10109	132,64151	5775,459	17442,926	
QP6	60,3074	4,2481968E+08		2332,110	4608,938
QP7	166,03452				

1	710,000	88,715	1733,466	0,0	3573,3
2	1,1881	157,9143	28524,999	27978,388	,620
3	5,813	112,489	11,885	48,052	48,552
4	1,167	160,863	110,479	7,321	7,274
5	196,000	-27,797	0,00000	0,00000	,88295
6	21463637,1	20924592,1	-73,8088	-89,1867	-75,8445
7	,30	0,00	8242251,9	-6263705,6	2134700,6
8	12,52	.000	19200,71	-15616,92	13047,41
9	0,000	30,4881	-9649472,3	3749187,8	2134700,6
10	10529728,5	26867,7	-22761,51	9719,51	13047,41
11	-11,585	158,832	49,918	169,345	95,679
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4817,365	316,576	608,157
14	,036	-6,289	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	191,87
16	72,33	119,54	0,00	0,00	0,0
QP4	.2415175	3528,553	28550,449	6,11318	1,1138570
QP5	68,10128	132,64668	5775,690	17442,377	
QP6	80,1817	4,2482615E+08		2332,340	4609,219
QP7	166,04409				

1	730,000	90,837	1823,108	0,0	3573,3
2	1,4813	157,9803	28510,952	27964,366	,782
3	5,276	94,817	21,581	65,755	66,089
4	1,474	160,942	109,988	5,901	5,863
5	196,000	-28,991	0,00000	0,00000	,88295
6	21476922,9	20924986,4	-134,3183	-151,8109	-70,8347
7	,30	0,00	8624047,3	-6574218,7	2400722,9
8	12,31	.000	18976,98	-15433,23	13553,44
9	0,000	30,4503	-10102066,6	3942435,0	2400722,9
10	11066479,3	26806,2	-22486,81	9604,61	13553,44
11	-12,418	153,744	67,194	172,104	91,745
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4831,407	316,576	608,157
14	,043	-9,413	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	192,19
16	72,35	119,34	0,00	0,00	0,0
QP4	.2415302	3528,566	28550,539	7,62314	1,1136531
QP5	68,10145	132,65077	5775,868	17441,963	
QP6	100,0539	4,2483127E+08		2332,517	4609,469
QP7	166,05383				

1	750,000	93.45	1912,628	0,0	3573,3
2	1,7735	158,0318	28493,763	27947,100	=,944
3	2,437	77.395	58,221	83,443	83,552
4	1,781	161.006	109,500	4,483	4,454
5	196,000	=30.183	0,00000	0,00000	=,88295
6	21493112,5	20925296,8	=155,0547	=174,7373	=56,1512
7	,00	0,00	9001257,7	=6880988,9	2676781,2
8	12,11	,000	18742,26	=15242,68	14050,94
9	0,000	30,4043	=10549221,8	4133348,2	2676781,2
10	11601926,3	26737,3	=22217,67	9486,13	14050,94
11	=13,228	158,665	84,599	173,532	89,180
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,292	4848,690	316,576	608,157
14	,046	=12,057	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	192,47
16	72,36	120,11	0,00	0,00	0,0
QP4	.2415380	3528,583	28550,561	9,13495	1,1134011
QP5	68.10157	132,65378	5775,992	17441,686	
QP6	119,9255	4,2483504E+08		2332,640	4609,688
QP7	166.06363				

1	760,000	94.941	1957,334	0,0	3573,3
2	1,9192	158,0522	28483,998	27937,258	=1,024
3	1,581	68.764	101,553	92,289	92,246
4	1,934	161,632	109,257	3,775	3,750
5	196,000	=30,779	0,00000	0,00000	=,88295
6	21502291,5	20925420,4	=159,4465	=180,2891	=48,0002
7	,00	0,00	9188075,5	=7032928,2	2818519,6
8	12,01	,000	18620,87	=15144,90	14296,35
9	0,000	30,3782	=10770682,8	4227907,6	2818519,6
10	11869115,8	26700,3	=22074,03	9425,60	14296,35
11	=13,625	158,629	93,334	173,962	88,167
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	4858,539	316,576	608,157
14	,047	=13,043	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	192,60
16	72,37	120,23	0,00	0,00	0,0
QP4	.2415401	3528,593	28550,546	9,88896	1,1132571
QP5	68.10163	132,65488	5776,033	17441,599	
QP6	129,8614	4,2483641E+08		2332,681	4609,785
QP7	166.06852				

END COAST PHASE YAW PROGRAM

1	760,000	94.941	1957,334	0,0	3573,3
2	1,9192	158,0522	28483,998	27937,258	-1,024
3	,581	68,764	101,553	92,289	92,246
4	1,934	161,032	109,257	3,775	3,750
5	196,000	-30,779	0,00000	0,00000	0,00000
6	21502291,5	20925420,4	-159,4465	-180,2891	-48,0002
7	,00	0,00	9188075,5	-7032928,2	2818519,6
8	12,01	,000	18620,87	-15144,90	14296,35
9	0,000	30,3782	-10770682,8	4227907,6	2818519,6
10	11869115,8	26700,3	-22074,03	9425,60	14296,35
11	-13,625	158,629	93,334	173,962	88,167
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4858,539	316,576	608,157
14	,047	-13,043	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	192,60
16	72,37	120,23	0,00	0,00	0,0
GP4	,2415401	3528,593	28550,546	9,88896	1,1132871
GP5	68,10163	132,65488	5776,033	17441,599	
GP6	129,8614	4,2483641E+08		2332,681	4609,785
GP7	166,06852				

1	-770,000	-96.553	2002,000	0,0	3573,3
2	2,0646	158,0691	28473,456	27926,614	-1,104
3	1,591	68,773	101,025	92,305	92,257
4	2,086	161,054	109,018	3,067	3,047
5	196,000	-31,375	0,00000	0,00000	0,00000
6	21512190,2	20925522,8	-159,4465	-180,2891	-48,0002
7	.50	0.00	9373666,2	-7183881,5	2962700,6
8	11,90	.000	18496,84	-15045,49	14539,47
9	0,000	30,3501	-10990692,4	4321857,5	2962700,6
10	12135926,3	26661,5	-21927,40	9364,24	14539,47
11	-14,019	158,594	93,298	174,370	88,145
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4869,189	316,576	608,157
14	042	-13,801	0,000	0,000	33461,521
15	11661245,1	6263073,3	50230978,3	2965366,8	192,72
16	72,38	120,34	0,00	0,00	0,0
GP4	.2415410	3528,603	28550,514	10,64230	1,1131012
GP5	68,10167	132,65570	5776,061	17441,546	
GP6	139,7976	4,2483745E+08		2332,709	4609,874
GP7	166,07340				

1	790,000	100,142	2091,199	0,0	3573,3
2	2,3544	158,0923	28450,062	27902,939	-1,263
3	1,609	68,781	100,114	92,337	92,278
4	2,390	161,087	108,533	1,653	1,642
5	196,000	-32,564	0,00000	0,00000	0,00000
6	21534137,3	20925664,1	-159,4465	-180,2891	-48,0002
7	.00	0.00	9741061,7	-7482765,9	3258297,1
8	11,68	.000	18241,00	-14841,91	15018,58
9	0,000	30,2878	-11426239,3	4507895,7	3258297,1
10	12668342,3	26579,0	-21625,36	9239,05	15018,58
11	-14,792	158,528	93,230	175,172	88,101
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	4892,873	316,576	608,157
14	035	-15,315	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	192,93
16	72,39	120,54	0,00	0,00	0,0
GP4	.2415392	3528,626	28550,400	12,14687	1,1127539
GP5	68,10173	132,65654	5776,078	17441,542	
GP6	159,6715	4,2483849E+08		2332,724	4610,025
GP7	166,08307				

1	800,000	102,117	2135,725	0,0	3573,3
2	2,4988	158,0986	28437,217	27889,916	=1,342
3	1,618	68,779	99,717	92,354	92,289
4	2,542	161,097	108,293	947	941
5	196,000	-33,158	0,00000	0,00000	0,00000
6	21546180,5	20925703,0	-159,4465	-180,2891	=48,0002
7	1,00	0,00	9922815,2	-7630665,6	3409664,5
8	11,56	0,00	18109,28	-14737,79	15254,48
9	0,000	30,2538	-11641718,7	4599968,1	3409664,5
10	12933915,2	26535,3	-21470,04	9175,28	15254,48
11	-15,173	158,497	93,199	175,568	88,078
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,282	4905,899	316,576	608,157
14	1,031	-16,071	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,03
16	72,40	120,63	0,00	0,00	0,0
GP4	.2415366	3528,639	28550,319	12,89802	1,1125625
GP5	68,10174	132,65655	5776,066	17441,590	
GP6	169,0095	4,2483851E+08		2332,712	4610,087
GP7	166,08784				

1	800,000	102,117	2135,725	0,0	3573,3
2	2,4988	158,0986	28437,217	27889,916	=1,342
3	1,618	68,779	99,717	92,354	92,289
4	2,542	161,097	108,293	947	941
5	196,000	-33,158	0,00000	0,00000	0,00000
6	21546180,5	20925703,0	-159,4465	-180,2891	=48,0002
7	1,00	0,00	9922815,2	-7630665,6	3409664,5
8	11,56	0,00	18109,28	-14737,79	15254,48
9	0,000	30,2538	-11641718,7	4599968,1	3409664,5
10	12933915,2	26535,3	-21470,04	9175,28	15254,48
11	-15,173	158,497	93,199	175,568	88,078
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,282	4905,899	316,576	608,157
14	1,031	-16,071	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,03
16	72,40	120,63	0,00	0,00	0,0
GP4	.2415366	3528,639	28550,319	12,89802	1,1125625
GP5	68,10174	132,65655	5776,066	17441,590	
GP6	169,0095	4,2483851E+08		2332,712	4610,087
GP7	166,08784				

1	900,000	128,391	2577,611	0,0	3573,3
2	3,9183	157,9737	28267,918	27717,450	=2,098
3	1,702	68,568	97,070	92,521	92,376
4	4,033	160,998	105,903	-6,058	-6,019
5	196,000	-39,067	0,00000	0,00000	0,00000
6	21705066,4	20924947,0	-159,4465	-180,2891	=48,0002
7	,00	0,00	11663291,3	-9049627,3	5048074,6
8	10,60	,000	16662,43	-13619,06	17468,30
9	0,000	29,8091	-13705890,6	5484221,3	5048074,6
10	15562691,8	26016,2	-19770,88	8498,69	17468,30
11	-18,815	158,244	92,958	179,353	87,832
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	5078,325	316,576	608,157
14	1,009	-23,575	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,60
16	72,43	121,17	0,00	0,00	0,0
QP4	.2414495	3529,795	28548,687	20,35876	1,1100091
QP5	68,10144	132,64249	5775,252	17443,821	
QP6	269,6618	4,2482091E+08		2331,895	4610,213
QP7	166,13063				

1	1000,000	166,027	3011,412	0,0	3573,3
2	5,2802	157,5082	28028,881	27472,779	=2,782
3	1,772	68,008	95,637	92,698	92,435
4	5,463	160,525	103,492	-12,923	-12,843
5	196,000	-44,899	0,00000	0,00000	0,00000
6	21931041,5	20922241,0	-159,4465	-180,2891	=48,0002
7	,00	0,00	13248512,1	-10350577,0	6893629,9
8	9,70	,000	15012,06	-12383,41	19391,82
9	0,000	29,1931	-15588292,9	6297828,4	6893629,9
10	18132766,8	25365,3	-17843,88	7765,82	19391,82
11	-22,232	158,050	92,808	182,911	87,561
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	5322,787	316,576	608,157
14	1,002	-30,946	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,80
16	72,45	121,35	0,00	0,00	0,0
QP4	.2412717	3528,969	28545,938	27,70202	1,1063373
QP5	68,10036	132,60568	5773,357	17448,729	
QP6	368,7255	4,2477483E+08		2329,997	4609,445
QP7	166,15880				

1	1100,000	214,149	3434,700	0,0	3573,3
2	6,5674	155,6934	27728,018	27163,957	-3,378
3	1,829	67,095	94,723	92,887	92,465
4	6,811	159,670	100,994	-19,591	-19,477
5	196,000	-50,630	0,00000	0,00000	0,00000
6	22219082,2	20917892,5	-159,4465	-180,2891	-48,0002
7	1,00	0,00	14660851,4	-11523606,9	8915893,9
8	8,91	.000	13207,16	-11066,66	20999,54
9	0,000	28,4356	-17268963,1	7036206,3	8915893,9
10	20632141,0	24606,0	-15745,92	6997,57	20999,54
11	-25,491	157,878	92,715	186,310	87,267
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	5631,161	316,576	608,157
14	1,000	-38,147	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,85
16	72,45	121,40	0,00	0,00	0,0
GP4	.2410402	3529,099	28542,751	34,89390	1,1016257
GP5	68,09864	132,55235	5770,732	17455,357	
GP6	468,6684	4,2470804E+08		2327,372	4607,982
GP7	166,16717				

1	1200,000	271,696	3845,581	0,0	3573,3
2	7,7662	155,5050	27374,510	26800,364	-3,877
3	1,872	65,805	94,074	93,091	92,464
4	8,064	158,407	98,341	-26,016	-25,876
5	196,000	-56,241	0,00000	0,00000	0,00000
6	22563165,0	20912314,9	-159,4465	-180,2891	-48,0002
7	1,00	0,00	15886455,2	-12562385,6	11082656,0
8	8,27	.000	11297,52	-9704,10	22281,29
9	0,000	27,5696	-18733703,6	7696839,6	11082656,0
10	23051099,9	23766,7	-13634,69	6214,16	22281,29
11	-28,624	157,708	92,662	189,584	86,952
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	5994,003	316,576	608,157
14	1,000	-45,145	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,87
16	72,45	121,42	0,00	0,00	0,0
GP4	.2407959	3529,125	28539,837	41,90398	1,0959696
GP5	68,09646	132,48981	5767,781	17462,632	
GP6	568,8947	4,2462966E+08		2324,422	4605,800
GP7	166,15483				

1	1380,889	337,494	4242,623	0,0	3573,3
2	8,8660	153,9004	26978,081	26391,978	=4,274
3	1901	64,099	93,575	93,312	92,431
4	9,249	156,694	95,454	-32,158	-32,000
5	196,000	-61,714	0,00000	0,00000	0,00000
6	22956607,7	20905965,5	-159,4465	-180,2891	=48,0002
7	,20	0,00	16918144,3	-13463985,2	13361389,4
8	7,84	,000	9330,37	-8328,16	23240,53
9	0,000	26,6284	-19973941,4	8279140,6	13361389,4
10	25382118,1	22850,6	-11264,48	5433,74	23240,53
11	-31,651	157,528	92,638	192,751	86,614
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	6401,298	316,576	608,157
14	,000	-51,917	0,000	0,000	33461,921
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,42	0,00	0,00	0,0
GP4	.2405743	3529,005	28537,775	48,70632	1,0894745
GP5	68,09401	132,42508	5764,873	17469,585	
GP6	669,3551	4,24548455+08		2321,516	4603,397
GP7	166.12457				

1	1375,652	392,004	4533,232	0,0	3573,3
2	9,6277	152,3721	26655,567	26059,347	=4,510
3	1915	62,493	93,261	93,494	92,385
4	10,000	155,062	93,059	-36,593	-36,428
5	196,000	-65,752	0,00000	0,00000	0,00000
6	23282772,2	20900923,3	-159,4465	-180,2891	=48,0002
7	,00	0,00	17567252,8	-14054883,8	15140331,2
8	7,62	,000	7829,96	-7295,66	23760,36
9	0,000	25,8853	-20760778,3	8668230,3	15140331,2
10	27083734,1	22131,1	-9537,59	4854,81	23760,36
11	-33,875	157,379	92,634	195,082	86,341
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	6732,864	316,576	608,157
14	,000	-56,881	0,000	0,000	33461,921
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2404378	3528,806	28537,008	53,70171	1,0840703
GP5	68,09209	132,37818	5762,877	17474,181	
GP6	745,4612	4,2448958E+08		2319,523	4601,536
GP7	166.09285				

ACQUISITION OF SIGNAL - SANTIAGO

(E* = 8.8 DEGREES)

1	1400,689	410,314	4624,926	0,0	3573,3
2	9,8595	151,8161	26548,384	25948,737	=4,575
3	,918	61,913	93,168	93,556	92,367
4	10,240	154,468	92,241	=37,980	=37,813
5	196,050	=67,032	0,00000	0,00000	0,00000
6	23392395,2	20899290,5	=159,4465	=180,2891	=48,0002
7	,00	0,00	17752025,9	=14228511,7	15720480,8
8	7,59	,000	7347,89	=6966,88	23891,59
9	0,000	25,6427	=20986251,9	8784201,8	15720480,8
10	27619715,3	21895,3	=8983,58	4671,65	23891,59
11	=34,582	157,323	92,636	195,822	86,250
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	6843,093	316,576	608,157
14	,000	=50,448	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2404008	3528,723	28536,920	55,28049	1,0822500
QP5	68,09147	132,36384	5762,290	17475,496	
QP6	769,9668	4,2447158E+08		2318,937	4600,948
QP7	166,08154				

1	1410,000	417,935	4662,324	0,0	3573,3
2	9,9529	151,5780	26503,941	25902,865	=4,600
3	,919	61,665	93,131	93,582	92,359
4	10,337	154,214	91,897	=38,543	=38,376
5	196,000	=67,554	0,00000	0,00000	0,00000
6	23438030,1	20898620,9	=159,4465	=180,2891	=48,0002
7	,00	0,00	17824516,3	=14297508,2	15959643,8
8	7,58	,000	7190,24	=6832,49	23940,54
9	0,000	25,5428	=21074952,2	8830544,4	15959643,8
10	27838182,0	21798,0	=8756,54	4596,94	23940,54
11	=34,868	157,307	92,636	196,124	86,212
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	6888,803	316,576	608,157
14	,000	=59,088	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2403868	3528,686	28536,908	55,92476	1,0814917
QP5	68,09122	132,35808	5762,057	17476,011	
QP6	780,6328	4,2446434E+08		2318,704	4600,710
QP7	166,07676				

1	1420,000	425.612	4699,569	0,0	3573,3
2	10,6451	151,3343	26459,267	25856,748	-4,624
3	,920	61.412	93,094	93,608	92,350
4	10,432	153.954	91,549	-39,103	-38,936
5	196,000	-68.075	0,00000	0,00000	0,00000
6	23484010,5	20897952,3	-159,4465	-180,2891	-48,0002
7	,00	0.00	17895031,4	-14365162,8	16199282,2
8	7,57	.000	6952,82	-6698,49	23986,66
9	0,000	25,4427	-21161383,7	8876141,6	16199282,2
10	28055674,0	21700,4	-8529,84	4522,55	23936,66
11	-35,155	157.285	92,637	196,425	86,174
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	6934,754	316,576	608,157
14	,000	-59,725	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403733	3528.647	28536,909	56,56660	1,0807273
GP5	68.09097	132.35239	5761,830	17476,511	
GP6	790,0993	4,2445726E+08		2318,477	4600,473
GP7	166.07192				

1	1430,000	433.345	4736,662	0,0	3573,3
2	10,1362	151,0846	26414,369	25810,395	-4,647
3	,921	61.152	93,058	93,635	92,341
4	10,526	153.688	91,197	-39,660	-39,492
5	196,000	-68.594	0,00000	0,00000	0,00000
6	23530329,7	20897285,3	-159,4465	-180,2891	-48,0002
7	,00	0.00	17963573,7	-14431479,5	16439367,6
8	7,55	.000	6755,68	-6564,92	24029,96
9	0,000	25,3424	-21245550,2	8920996,4	16439367,6
10	28272188,8	21602,5	-8303,52	4448,48	24029,96
11	-35,441	157.263	92,638	196,725	86,135
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	6980,939	316,576	608,157
14	,000	-60.359	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403605	3528.607	28536,922	57,20597	1,0799569
GP5	68.09072	132.34679	5761,607	17476,996	
GP6	800,1661	4,2445016E+08		2318,255	4600,238
GP7	166.06704				

1	1440,000	441,133	4773,602	0,0	3573,3
2	10,2261	150,829	26369,255	25763,815	=4,669
3	1921	60,887	93,022	93,661	92,332
4	10,619	153,415	90,839	=40,212	=40,044
5	196,000	=69,111	0,00000	0,00000	0,00000
6	23576980,5	20896620,1	=159,4465	=180,2891	=48,0002
7	1,00	0,00	18030146,1	=14496462,5	16679872,1
8	7,54	.000	6598,85	=6431,77	24070,48
9	0,000	25,2421	=21327455,4	8965112,3	16679872,1
10	28487724,0	21504,5	=8077,61	4374,75	24070,48
11	-35,726	157,240	92,639	197,025	86,096
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	7027,347	316,576	608,157
14	1,000	=60,991	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403482	3528,566	28536,949	57,84288	1,0791806
GP5	68,09047	132,34128	5761,390	17477,465	
GP6	810,2331	4,24443235+08		2318,039	4600,005
GP7	166,06211				

1	1450,000	448,973	4810,388	0,0	3573,3
2	10,3150	150,5672	26323,935	25717,017	=4,690
3	1922	60,615	92,987	93,688	92,323
4	10,711	153,136	90,477	=40,761	=40,593
5	196,000	=69,626	0,00000	0,00000	0,00000
6	23623956,0	20895957,0	=159,4465	=180,2891	=48,0002
7	1,00	0,00	18094751,7	=14560116,4	16920768,0
8	7,52	.000	6362,34	=6299,09	24108,24
9	0,000	25,1417	=21407103,7	9008492,7	16920768,0
10	28702277,3	21406,2	=7852,14	4381,37	24108,24
11	-36,011	157,218	92,641	197,323	86,057
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	7073,971	316,576	608,157
14	1,000	=61,620	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403367	3528,523	28536,988	58,47733	1,0783985
GP5	68,09023	132,33585	5761,179	17477,919	
GP6	820,3084	4,2443641E+08		2317,828	4599,775
GP7	166,05714				

1	1450,000	448,973	4810,388	0,0	3573,3
2	10,3150	150,5672	26323,935	25717,017	-4,690
3	1922	60,615	92,987	93,688	92,323
4	10,711	153,136	90,477	-40,761	-40,593
5	196,000	-69,626	0,00000	0,00000	0,00000
6	23623956,0	20895957,0	-159,4465	-180,2891	-48,0002
7	,00	0,00	18094751,7	-14560116,4	16920768,0
8	7,52	,000	6362,34	-6299,09	24108,24
9	0,000	25,1417	-21407103,7	9008492,7	16920768,0
10	28702277,3	21406,2	-7852,14	4301,37	24108,24
11	-36,011	157,218	92,641	197,323	86,057
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7073,971	316,576	608,157
14	,000	-61,620	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403367	3528,523	28536,988	58,47733	1,0783985
GP5	68,09023	132,33565	5761,179	17477,919	
GP6	820,6004	4,2443641E+08		2317,828	4599,775
GP7	166,05714				

1	1455,000	452,913	4828,724	0,0	3573,3
2	10,3590	150,4340	26301,201	25693,539	-4,701
3	1922	60,477	92,970	93,702	92,318
4	10,757	152,994	90,294	-41,034	-40,866
5	196,000	-69,883	0,00000	0,00000	0,00000
6	23647563,4	20895626,3	-159,4465	-180,2891	-48,0002
7	,00	0,00	18126318,1	-14591446,4	17041354,1
8	7,52	,000	6264,23	-6232,92	24126,09
9	0,000	25,0914	-21446083,0	9029908,1	17041354,1
10	28809185,1	21356,9	-7739,59	4264,81	24126,09
11	-36,153	157,206	92,642	197,472	86,038
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7097,361	316,576	608,157
14	,000	-61,934	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403311	3528,501	28537,013	58,79363	1,0780054
GP5	68,09010	132,33317	5761,076	17478,140	
GP6	825,3341	4,2443305E+08		2317,725	4599,661
GP7	166,05464				

1	1460,000	456,865	4847,022	0,0	3573,3
2	10,4027	150,2993	26278,417	25670,010	-4,711
3	1,922	60,337	92,952	93,716	92,313
4	10,802	152,850	90,110	-41,307	-41,138
5	196,000	-70,140	0,00000	0,00000	0,00000
6	23671249,4	20895296,3	-159,4465	-180,2891	-48,0002
7	1,00	0,00	18157394,2	-14622445,8	17162027,7
8	7,51	0,000	6166,20	-6166,87	24143,26
9	0,000	25,0412	-21484499,8	9051141,0	17162027,7
10	28915846,6	21307,7	-7627,16	4228,34	24143,26
11	-36,294	157,195	92,642	197,621	86,018
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,262	7120,801	316,576	608,157
14	1,000	-62,247	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403258	3528,479	28537,042	59,10931	1,0776108
GP5	68,08998	132,33051	5760,973	17478,356	
GP6	830,3678	4,2442971E+08		2317,623	4599,547
GP7	166,05213				

1	1465,000	460,831	4865,281	0,0	3573,3
2	10,4462	150,1629	26255,586	25646,430	-4,721
3	1,923	60,196	92,935	93,730	92,308
4	10,847	152,705	89,924	-41,578	-41,410
5	196,000	-70,396	0,00000	0,00000	0,00000
6	23695013,1	20894967,1	-159,4465	-180,2891	-48,0002
7	1,00	0,00	18187980,3	-14653115,4	17282785,6
8	7,50	0,000	6068,28	-6100,95	24159,76
9	0,000	24,9909	-21522354,8	9072191,7	17282785,6
10	29022201,7	21258,4	-7514,85	4191,97	24159,76
11	-36,436	157,183	92,643	197,770	85,998
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7144,291	316,576	608,157
14	1,000	-62,560	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403205	3528,456	28537,073	59,42436	1,0772149
GP5	68,08986	132,32787	5760,873	17478,569	
GP6	835,4016	4,2442639E+08		2317,522	4599,435
GP7	166,04961				

1	1470,000	464,808	4883,502	0,0	3573,3
2	10,4894	150,0250	26232,708	25622,801	=4,731
3	1,923	60,053	92,918	93,744	92,303
4	10,891	152,558	89,738	=41,848	=41,680
5	196,000	=70,651	0,00000	0,00000	0,00000
6	23718853,7	20894638,5	=159,4465	=180,2891	=48,0002
7	,00	0,00	18218077,1	=14683455,6	17403624,2
8	7,50	.000	5970,45	=6035,15	24175,58
9	0,000	24,9407	=21559648,6	9093060,8	17403624,2
10	29128430,1	21209,0	=7402,68	4155,68	24175,58
11	-36,577	157,171	92,644	197,918	85,978
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	7167,830	316,576	608,157
14	1,000	=62,872	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403155	3528,433	28537,108	59,73880	1,0768176
GP5	68,08974	132,32526	5760,773	17478,778	
GP6	846,4383	4,2442311E+08		2317,423	4599,322
GP7	166,04709				

1	1475,000	468,798	4901,684	0,0	3573,3
2	10,5323	149,8854	26209,785	25599,124	=4,740
3	1,923	59,909	92,901	93,758	92,297
4	10,936	152,409	89,549	=42,118	=41,949
5	196,000	=70,906	0,00000	0,00000	0,00000
6	23742770,2	20894310,7	=159,4465	=180,2891	=48,0002
7	,00	0,00	18247685,0	=14713467,1	17524540,2
8	7,49	.000	5872,73	=5969,48	24190,73
9	0,000	24,8904	=21596381,8	9113748,7	17524540,2
10	29234351,5	21159,6	=7280,65	4119,49	24190,73
11	-36,718	157,160	92,645	198,066	85,958
12	0,0	0,0	=31,908	0,000	34125,517
13	346,266	38,202	7191,416	316,576	608,157
14	1,000	=63,183	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403106	3528,410	28537,146	60,05261	1,0764189
GP5	68,08962	132,32267	5760,676	17478,983	
GP6	845,4691	4,2441986E+08		2317,325	4599,211
GP7	166,04456				

1	1480,000	472,801	4919,828	0,0	3573,3
2	10,5749	149,7442	26186,818	25575,400	-4,749
3	,923	59,763	92,884	93,772	92,292
4	10,980	152,259	89,360	-42,386	-42,218
5	196,000	-71,160	0,00000	0,00000	0,00000
6	23766762,0	20893983,7	-159,4465	-180,2891	-48,0002
7	,00	0,00	18276804,6	-14743150,6	17645530,4
8	7,48	.000	5775,12	-5903,94	24205,22
9	0,000	24,8402	-21632555,3	9134255,8	17645530,4
10	29340025,8	21110,1	-7178,75	4083,39	24205,22
11	-36,859	157,148	92,646	198,214	85,938
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7218,049	316,576	608,157
14	,000	-63,494	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403059	3528,386	28537,187	60,36580	1,0760189
GP5	68,08949	132,32010	5760,579	17479,184	
GP6	850,5028	4,2441663E+08		2317,229	4599,100
GP7	166,04202				

1	1485,000	476,815	4937,934	0,0	3573,3
2	10,6172	149,6013	26163,806	25551,630	-4,759
3	,923	59,615	92,867	93,786	92,287
4	11,023	152,107	89,169	-42,654	-42,485
5	196,000	-71,414	0,00000	0,00000	0,00000
6	23790828,0	20893657,6	-159,4465	-180,2891	-48,0002
7	,00	0,00	18305436,5	-14772586,7	17766591,3
8	7,48	.000	5677,62	-5838,92	24219,04
9	0,000	24,7899	-21668169,6	9154582,7	17766591,3
10	29445452,7	21068,6	-7067,00	4047,38	24219,04
11	-36,999	157,136	92,647	198,362	85,918
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7238,727	316,576	608,157
14	,000	-63,804	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2403013	3528,362	28537,231	60,67837	1,0756175
GP5	68,08937	132,31756	5760,484	17479,380	
GP6	855,5365	4,2441344E+08		2317,134	4598,990
GP7	166,03948				

1	1490,930	480.842	4956,001	0,0	3573,3
2	10,5592	149,4568	26140,753	25527,814	=4,768
3	1923	59,466	92,850	93,800	92,281
4	11,067	151,953	88,977	-42,920	-42,752
5	196,000	-71,668	0,00000	0,00000	0,00000
6	23814967,5	20893332,4	-159,4465	-180,2891	=48,0002
7	,00	0,00	18333581,1	-14801536,0	17887719,7
8	7,47	.000	5580,24	-5773,24	24232,21
9	0,000	24,7396	-21703225,5	9174729,8	17887719,7
10	29550632,1	21011,1	-6955,39	4011,47	24232,21
11	-37,139	157,124	92,648	198,509	85,898
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7262,450	316,576	608,157
14	,000	-64,113	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402969	3528,338	28537,278	60,99031	1,0752148
GP5	68,08925	132,31504	5760,390	17479,573	
GP6	860,8701	4,2441027E+08		2317,041	4598,881
GP7	166.03694				

1	1495,000	484.880	4974,031	0,0	3573,3
2	10,7010	149,3106	26117,658	25503,955	=4,776
3	1923	59,315	92,834	93,815	92,276
4	11,110	151,797	88,783	-43,186	-43,018
5	196,000	-71,920	0,00000	0,00000	0,00000
6	23839179,7	20893008,1	-159,4465	-180,2891	=48,0002
7	,00	0,00	18361239,0	-14830239,3	18008912,3
8	7,46	.000	5482,97	-5708,10	24244,72
9	0,000	24,6894	-21737723,7	9194697,6	18008912,3
10	29655563,8	20961,5	-6843,94	3975,66	24244,72
11	-37,280	157,112	92,649	198,656	85,877
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7266,216	316,576	608,157
14	,000	-64,422	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402926	3528,314	28537,329	61,30162	1,0748108
GP5	68,08913	132,31255	5760,298	17479,762	
GP6	865,6037	4,2440714E+08		2316,949	4598,773
GP7	166.03439				

1	1495.652	485.407	4976.379	0.0	3973.3
2	10.7064	149.2914	26114.643	25500.840	-4.777
3	.923	59.295	92.832	93.817	92.275
4	11.116	151.777	88.758	-43.220	-43.052
5	196.000	-71.953	0.00000	0.00000	0.00000
6	23842342.2	20892965.8	-159.4465	-180.2891	-48.0002
7	.00	0.00	18364809.8	-14833958.2	18024720.4
8	7.46	.000	5470.30	-5699.61	24246.30
9	0.000	24.6828	-21742181.3	9197288.2	18024720.4
10	0.0	0.0	-6829.41	3971.00	24246.30
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7289.318	316.576	608.157
14	.000	-64.462	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402921	3528.310	28537.336	61.34217	1.0747581
GP5	68.08912	132.31223	5760.286	17479.786	
GP6	866.2601	4.2440675E+08		2316.937	4598.759
GP7	166.03406				

JETTISON STAGE II, ACTIVATE RETRO SYSTEM

1	1495.652	485.407	4976.379	0.0	1500.0
2	10.7064	149.2914	26114.643	25500.840	-4.777
3	.923	59.295	92.832	93.817	92.275
4	11.116	151.777	88.758	-43.220	-43.052
5	196.000	-71.953	0.00000	0.00000	0.00000
6	23842342.2	20892965.8	-159.4465	-180.2891	-48.0002
7	.00	0.00	18364809.8	-14833958.2	18024720.4
8	7.46	.000	5470.30	-5699.61	24246.30
9	0.000	24.6828	-21742181.3	9197288.2	18024720.4
10	0.0	0.0	-6829.41	3971.00	24246.30
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7289.318	316.576	608.157
14	.000	-64.462	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402921	3528.310	28537.336	61.34217	1.0747581
GP5	68.08912	132.31223	5760.286	17479.786	
GP6	866.2601	4.2440675E+08		2316.937	4598.759
GP7	166.03406				

1	1500.000	487.93	4992.021	0.0	1500.0
2	10.7425	149.1627	26094.922	25480.052	-4.785
3	.923	59.162	92.817	93.829	92.270
4	11.153	151.64	88.588	-43.451	-43.282
5	196.000	-72.173	0.00000	0.00000	0.00000
6	23863463.5	20892654.7	-159.4465	-180.2891	-48.0002
7	.00	0.00	18388411.0	-14258617.2	18130165.8
8	7.45	.00	5385.83	-5643.09	24256.58
9	0.000	24.6391	-21771669.1	9214486.6	18130165.8
10	0.0	0.0	-6732.64	3939.95	24256.58
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7310.024	316.576	608.157
14	.000	-64.730	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402885	3528.289	28537.382	61.61231	1.0744056
GP5	68.88901	132.31008	5760.208	17479.947	
GP6	870.6373	4.2440404E+08		2316.859	4598.665
GP7	166.03184				

1	1505.000	492.991	5009.974	0.0	1500.0
2	10.7837	149.0131	26071.346	25456.108	-4.793
3	.923	59.008	92.801	93.844	92.265
4	11.195	151.48	88.391	-43.714	-43.546
5	196.000	-72.424	0.00000	0.00000	0.00000
6	23887018.3	20892362.3	-159.4465	-180.2891	-48.0002
7	.00	0.00	18415097.5	-14886670.4	18251477.0
8	7.45	.000	5288.81	-5578.22	24267.79
9	0.000	24.5889	-21805050.4	9234097.3	10251477.0
10	0.0	0.0	-6621.49	3904.33	24267.79
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7333.874	316.576	608.157
14	.000	-65.038	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402846	3528.263	28537.439	61.92238	1.0739990
GP5	68.88890	132.30764	5760.118	17480.127	
GP6	875.6707	4.2440096E+08		2316.770	4598.558
GP7	166.02928				

1	1510,000	497.064	3027.888	0.0	1500.0
2	10.8246	148.8617	26048.132	25432.123	-4.801
3	.923	58.852	92.784	93.359	92.259
4	11.237	151.319	88.193	-43.977	-43.809
5	196,000	-72.675	0.00000	0.00000	0.00000
6	23912243.2	20892041.0	-159.4465	-180.2891	-48.0002
7	.00	0.00	18441299.3	-14914399.6	18372842.6
8	7.44	.000	5191.91	-5513.49	24278.35
9	0.000	24.5387	-21837880.3	9253530.1	18372842.6
10	0.0	0.0	-6510.51	3868.82	24278.35
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7397.764	316.576	608.157
14	.000	-65.344	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402808	3523.238	28537.499	62,23181	1.0735911
GP5	68.08878	132.30522	5760.031	17480.304	
GP6	880.7041	4.2439792E+08		2316.682	4598.452
GP7	166.02673				

1	1515,000	501.148	5045.764	0.0	1500.0
2	10.8652	148.7086	26024.881	25408.097	-4.809
3	.923	58.694	92.768	93.873	92.253
4	11.279	151.156	87.994	-44.239	-44.071
5	196,000	-72.926	0.00000	0.00000	0.00000
6	23936737.3	20891720.7	-159.4465	-180.2891	-48.0002
7	.00	0.00	18467016.9	-14041805.5	18494250.4
8	7.43	.000	5095.15	-5448.90	24288.28
9	0.000	24.4885	-21870155.7	9272785.6	18494250.4
10	0.0	0.0	-6399.69	3833.40	24288.28
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7381.693	316.576	608.157
14	.000	-65.651	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402772	3528.212	28537.562	62,54062	1.0731820
GP5	68.08866	132.30282	5759.944	17480.476	
GP6	885.7375	4.2439491E+08		2316.596	4598.347
GP7	166.02418				

1	1528,333	505.243	5063,801	0,0	1500,0
2	10,9056	148,5538	26001,992	25384,033	-4,817
3	,923	58,534	92,752	93,888	92,247
4	11,321	150,992	87,793	-44,500	-44,332
5	196,000	-73,176	0,00000	0,00000	0,00000
6	23961299,8	20891481,5	-159,4465	-180,2891	-48,0002
7	,00	0,00	18492251,0	-14968888,9	18615724,3
8	7,43	,000	4998,52	-5384,45	24297,56
9	0,000	24,4383	-21901877,5	9291864,3	18615724,3
10	0,0	0,0	-6289,04	3798,09	24297,56
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7405,661	316,576	608,157
14	,000	-65,956	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402737	3528,186	28537,627	62,84880	1,0727717
GP5	68,08854	132,30045	5759,859	17480,645	
GP6	890,7707	4,2439193E+08		2316,511	4598,243
GP7	166,02162				

1	1528,000	509,349	5081,400	0,0	1500,0
2	10,9457	148,3971	25978,268	25359,931	-4,824
3	,923	58,373	92,735	93,903	92,241
4	11,362	150,825	87,590	-44,759	-44,592
5	196,000	-73,426	0,00000	0,00000	0,00000
6	23985929,8	20891083,5	-159,4465	-180,2891	-48,0002
7	,00	0,00	18517002,3	-14995650,3	18737234,0
8	7,42	,000	4902,03	-5320,15	24306,22
9	0,000	24,3881	-21933046,5	9310766,7	18737234,0
10	0,0	0,0	-6178,57	3762,88	24306,22
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7429,667	316,576	608,157
14	,000	-66,261	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402704	3528,160	28537,696	63,15636	1,0723601
GP5	68,08843	132,29810	5759,776	17480,809	
GP6	895,8038	4,2439898E+08		2316,428	4598,139
GP7	166,01907				

1	1538,000	513.485	5099,161	0,0	1500,0
2	10,9855	148,2387	25954,909	25335,791	-4,832
3	,923	58,210	92,719	93,918	92,235
4	11,403	150,657	87,386	-45,018	-44,851
5	196,000	-73,674	0,00000	0,00000	0,00000
6	24010626,6	20890766,6	-159,4465	-180,2891	-48,0002
7	,00	0,00	18541271,5	-15022090,6	18058785,4
8	7,41	,000	4805,68	-5256,00	24314,24
9	0,000	24,3380	-21963663,5	9329493,2	18858785,4
10	0,0	0,0	-6068,27	3727,77	24314,24
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7493,709	316,576	608,157
14	,000	-66,566	0,000	0,000	33461,521
15	11661245,1	6263073,1	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402673	3528,133	28537,768	63,46328	1,0719473
GP5	68,18831	132,29578	5759,694	17480,970	
GP6	900,8368	4,2438607E+08		2316,346	4598,037
GP7	166,01652				

1	1538,000	517.593	5116,884	0,0	1500,0
2	11,0250	148,0784	25931,516	25311,616	-4,839
3	,923	58,045	92,703	93,934	92,229
4	11,444	150,488	87,181	-45,276	-45,109
5	196,000	-73,923	0,00000	0,00000	0,00000
6	24035389,2	20890450,9	-159,4465	-180,2891	-48,0002
7	,00	0,00	18565059,3	-15048210,6	18980375,3
8	7,41	,000	4709,47	-5192,00	24321,64
9	0,000	24,2878	-21993729,4	9348044,5	18980375,3
10	0,0	0,0	-5958,14	3692,76	24321,64
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7477,786	316,576	608,157
14	,000	-66,869	0,000	0,000	33461,521
15	11661245,1	6263073,1	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402643	3528,106	28537,843	63,76957	1,0715333
GP5	68,08819	132,29349	5759,614	17481,126	
GP6	905,8696	4,2438319E+08		2316,266	4597,935
GP7	166,01396				

1	1540,050	521.731	5134.589	0,0	1500,0
2	11,0642	147,9162	25908,091	25287,405	-4,846
3	,922	57,878	92,687	93,949	92,223
4	11,484	150,314	86,973	-45,533	-45,366
5	196,000	-74,170	0,00000	0,00000	0,00000
6	24060217,0	20890136,4	-159,4465	-180,2891	-48,0002
7	,00	0,00	18588366,5	-15074010,9	19102000,7
8	7,40	.000	4613,41	-5128,15	24328,41
9	0,000	24,2377	-22023249,2	9366421,1	19102000,7
10	0,0	0,0	-3848,20	3657,86	24328,41
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7501,898	316,576	608,157
14	,000	-67,172	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402615	3528,079	28537,920	64,07524	1,0711181
GP5	68,08808	132,29122	5759,935	17481,278	
GP6	910,9023	4,2438033E+08		2316,187	4597,834
GP7	166,01142				

1	1549,000	525,879	5152,215	0,0	1500,0
2	11,1032	147,7523	25884,633	25263,161	-4,852
3	,922	57,709	92,672	93,965	92,217
4	11,925	150,140	86,765	-45,789	-45,622
5	196,000	-74,417	0,00000	0,00000	0,00000
6	24085109,0	20889823,2	-159,4465	-180,2891	-48,0002
7	,00	0,00	18611193,7	-15099492,3	19223658,4
8	7,39	.000	4517,49	-5064,45	24334,56
9	0,000	24,1877	-22052211,7	9384623,3	19223658,4
10	0,0	0,0	-5738,44	3623,07	24334,56
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	7526,844	316,576	608,157
14	,000	-67,475	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402588	3528,051	28538,001	64,38027	1,0707017
GP5	68,08796	132,28898	5759,457	17481,427	
GP6	915,9349	4,2437751E+08		2316,110	4597,734
GP7	166,00887				

1	1550.000	530.037	5169.823	0.0	1500.0
2	11.1418	147.5864	25861.144	25238.883	-4.859
3	.922	57.539	92.656	93.980	92.210
4	11.564	149.963	86.554	-46.043	-45.877
5	196.000	-74.663	0.00000	0.00000	0.00000
6	24110064.4	20889511.2	-159.4465	-180.2891	-48.0002
7	.00	0.00	18633541.6	-15124655.6	19345345.3
8	7.38	.000	4421.73	-5000.90	24340.10
9	0.000	24.1377	-22080629.9	9402651.9	19345345.3
10	0.0	0.0	-5628.87	3588.38	24340.10
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7550.222	316.576	608.157
14	.000	-67.777	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402563	3528.024	28538.084	64.68467	1.0702841
GP5	68.08785	132.28676	5759.381	17481.571	
GP6	920.9674	4.2437473E+08		2316.034	4597.635
GP7	166.00633				

1	1550.000	530.037	5169.823	0.0	1500.0
2	11.1418	147.5864	25861.144	25238.883	-4.859
3	.922	57.539	92.656	93.980	92.210
4	11.564	149.963	86.554	-46.043	-45.877
5	196.000	-74.663	0.00000	0.00000	0.00000
6	24110064.4	20889511.2	-159.4465	-180.2891	-48.0002
7	.00	0.00	18633541.6	-15124655.6	19345345.3
8	7.38	.000	4421.73	-5000.90	24340.10
9	0.000	24.1377	-22080629.9	9402651.9	19345345.3
10	0.0	0.0	-5628.87	3588.38	24340.10
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	7550.222	316.576	608.157
14	.000	-67.777	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2402563	3528.024	28538.084	64.68467	1.0702841
GP5	68.08785	132.28676	5759.381	17481.571	
GP6	920.9674	4.2437473E+08		2316.034	4597.635
GP7	166.00633				

1	1650,000	815.143	5514.015	0,0	1500,0
2	11,8562	143,8428	25386,171	24747,763	-4,952
3	,912	53,704	92,352	94,321	92,066
4	12,299	145,996	81,970	-50,920	-50,760
5	196,000	-79,423	0,00000	0,00000	0,00000
6	24621247,0	20883585,2	-159,4465	-180,2891	-48,0002
7	,00	0,00	18981140,9	-15562358,9	21780631,7
8	7,24	,000	2542,21	-3764,43	24327,31
9	0,000	23,1467	-22535411,2	9727588,0	21780631,7
10	0,0	0,0	-3481,35	2917,88	24327,31
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	8539,270	316,576	608,157
14	,000	-73,683	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402370	3527,422	28540,293	70,64031	1,0617063
GP5	68,08571	132,24792	5758,164	17483,640	
GP6	1021,5730	4,2432588E+08		2314,821	4595,864
GP7	165,95715				

1	1750,000	703,216	5843,274	0,0	1500,0
2	12,4591	139,1623	24905,698	24250,648	-4,981
3	,894	48,938	92,063	94,736	91,892
4	12,918	141,060	76,537	-55,344	-55,195
5	196,000	-83,598	0,00000	0,00000	0,00000
6	25151181,7	20878376,9	-159,4465	-180,2891	-48,0002
7	,00	0,00	19144658,4	-15879941,2	24203638,5
8	7,10	,000	742,75	-2599,81	24099,45
9	0,000	22,1835	-22780131,8	9987796,2	24203638,5
10	0,0	0,0	-1430,58	2294,56	24099,45
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	8534,241	316,576	608,157
14	,000	-79,344	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2402700	3526,764	28543,336	76,34522	1,0527617
GP5	68,08386	132,21958	5757,492	17484,282	
GP6	1122,0640	4,2429013E+08		2314,153	4594,521
GP7	165,91360				

1	1853,000	793.278	6158,092	0,0	1500,0
2	12,9533	133.3426	24425,342	23753,449	-4,955
3	,869	43.038	91,781	95,280	91,688
4	13,424	134.956	70,038	-59,256	-59,119
5	196,000	-85.669	0,00000	0,00000	0,00000
6	25694039,3	20874009,5	-159,4465	-180,2891	-48,0002
7	,00	0,00	19102809,2	-16084920,5	26594323,9
8	6,95	,000	-963,33	-1513,08	23685,63
9	0,000	21,2585	-22825241,6	10188101,0	26594323,9
10	0,0	0,0	508,95	1720,00	23685,63
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	9029,349	316,576	608,157
14	,000	-84.767	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121.43	0,00	0,00	0,0
GP4	.2403430	3526,093	28546,893	81,80509	1,0435398
GP5	68.08235	132,20061	5757,288	17483,751	
GP6	1222,4105	4,2426662E+08		2313,952	4593,614
GP7	165.87820				

1	1950,000	884.446	6459,082	0,0	1500,0
2	13,3420	126.1864	23949,721	23261,058	-4,886
3	,838	35.808	91,499	96,077	91,455
4	13,821	127.487	62,268	-62,576	-62,451
5	196,000	-83.540	0,00000	0,00000	0,00000
6	26244525,3	20870542,6	-159,4465	-180,2891	-48,0002
7	,00	0,00	18955396,1	-16185250,6	28935485,1
8	6,81	,000	-2567,44	-507,05	23113,37
9	0,000	20,3786	-22682355,9	10333446,1	28935485,1
10	0,0	0,0	2328,22	1195,09	23113,37
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	9519,836	316,576	608,157
14	,000	-89.965	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121.43	0,00	0,00	0,0
GP4	.2404430	3525,448	28550,653	87,02921	1,0341225
GP5	68.08117	132,19067	5757,458	17482,342	
GP6	1322,6034	4,2425385E+08		2314,124	4593,117
GP7	165.85217				

1	2050.000	975.939	6746.928	0.0	1500.0
2	13.6296	117.5829	23482.554	22777.444	-4.781
3	.802	27.137	91.212	97.495	91.197
4	14.115	118.546	53.105	-65.205	-65.091
5	196.000	-79.665	0.00000	0.00000	0.00000
6	26797889.3	20867985.7	-159.4465	-180.2891	-48.0002
7	.00	0.00	18622883.5	-16189031.0	31212561.1
8	6.66	.000	-4064.79	418.05	22407.92
9	0.000	19.5481	-22363766.3	10428733.0	31212561.1
10	0.0	0.0	4022.55	718.56	22407.92
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	10001.899	316.576	608.157
14	.000	-94.947	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2405579	3524.862	28554.352	92.02939	1.0245845
GP5	68.08032	132.18766	5757.904	17480.343	
GP6	1422.8492	4.2425007E+08		2314.571	4592.981
GP7	165.83564				

1	2062.268	987.151	6781.368	0.0	1500.0
2	13.6581	115.4298	23425.975	22718.881	-4.766
3	.798	25.976	91.176	97.759	91.163
4	14.144	117.352	51.887	-65.475	-65.362
5	196.000	-79.158	0.00000	0.00000	0.00000
6	26865763.0	20867733.6	-159.4465	-180.2891	-48.0002
7	.00	0.00	18571934.0	-16183238.9	31486882.9
8	6.65	.000	-4241.01	526.03	22313.33
9	0.000	19.4497	-22313194.0	10437208.8	31486882.9
10	0.0	0.0	4221.71	663.33	22313.33
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	10060.249	316.576	608.157
14	.000	-95.544	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2405725	3524.795	28554.791	92.62803	1.0234095
GP5	68.08024	132.18772	5757.974	17480.069	
GP6	1434.9135	4.2425014E+08		2314.641	4592.986
GP7	165.83425				

LOSS OF SIGNAL - SANTIAGO
(E* = 5 DEGREES)

1	2150,000	1057,066	7022,336	0,0	1500,0
2	13,8206	107,6427	23026,784	22305,771	-4,648
3	1,763	17,134	90,916	101,323	90,913
4	14,310	108,245	42,693	-67,043	-66,937
5	196,000	-75,465	0,00000	0,00000	0,00000
6	27349910,4	20866311,1	-159,4465	-180,2891	-48,0002
7	0,00	0,00	16146062,2	-16104289,9	33413385,3
8	0,53	0,00	-5453,50	1263,86	21591,88
9	0,000	18,7687	-21882057,3	10478700,6	33413385,3
10	0,0	0,0	5590,61	288,29	21591,88
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	344,266	38,202	10472,353	316,576	608,157
14	0,000	-99,728	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2406773	3524,355	28557,778	96,81900	1,0149939
GP5	68,07977	132,19036	5758,537	17478,008	
GP6	1922,5653	4,2425347E+08		2315,205	4593,146
GP7	165,82802				

1	2250,000	1157,222	7286,020	0,0	1500,0
2	13,9197	96,8224	22584,695	21848,516	-4,494
3	1,720	6,258	90,606	171,751	90,606
4	14,411	97,043	31,363	-68,015	-67,915
5	196,000	-71,219	0,00000	0,00000	0,00000
6	27896868,1	20865465,0	-159,4465	-180,2891	-48,0002
7	0,00	0,00	17935794,6	-15938804,2	35527918,8
8	0,39	0,00	-6733,92	2033,36	20685,20
9	0,000	18,0408	-21249817,5	10487841,9	35527918,8
10	0,0	0,0	7033,52	-98,47	20685,20
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	344,266	38,202	10928,949	316,576	608,157
14	0,000	-104,321	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	.2407932	3523,943	28560,780	101,41223	1,0054121
GP5	68,07950	132,19744	5759,280	17475,546	
GP6	1622,3745	4,2426238E+08		2315,948	4593,549
GP7	165,82822				

1	2350.000	1245.885	7938.661	0.0	1900.0
2	13.9319	85.8863	22158.025	21407.583	-4.323
3	.674	355.271	90.280	-93.717	90.279
4	14.423	85.708	19.992	-68.118	-68.020
5	196.000	-66.996	0.00000	0.00000	0.00000
6	2843553.5	20865377.4	-159.4465	-180.2891	-48.0002
7	.00	0.00	16802827.4	-19700029.6	37547983.6
8	6.26	.000	-7907.91	2730.41	19705.19
9	0.000	17.3637	-20479429.0	10460350.2	37547983.6
10	0.0	0.0	8354.18	-444.92	19705.19
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	11369.812	316.576	608.157
14	.000	-108.738	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2408996	3523.633	28563.264	105.82345	.9958953
GP5	68.07947	132.20774	5760.073	17473.119	
GP6	1722.1022	4.2427534E+08		2316.740	4594.130
GP7	165.83494				

1	2450.000	1332.599	7780.494	0.0	1500.0
2	13.8618	75.639	21748.069	20984.403	-4.139
3	.627	344.978	89.933	-89.557	89.934
4	14.352	75.046	9.340	-67.432	-67.334
5	196.000	-62.817	0.00000	0.00000	0.00000
6	28962976.8	20865968.6	-159.4465	-180.2891	-48.0002
7	.00	0.00	15957660.6	-15394990.9	39467010.1
8	6.14	.000	-8978.47	3359.40	18666.72
9	0.000	16.7358	-19582922.5	10400087.7	39467010.1
10	0.0	0.0	9556.64	-754.46	18666.72
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	11793.564	316.576	608.157
14	.000	-112.992	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2409925	3523.424	28565.179	110.06683	.9864941
GP5	68.07965	132.22028	5760.869	17470.843	
GP6	1821.7734	4.2429112E+08		2317.555	4594.835
GP7	165.64682				

1	2550.000	1416.972	8013.286	0.0	1500.0
2	13.7141	66.6202	21355.771	20580.024	-3.947
3	.578	335.918	89.561	-88.078	89.572
4	14.200	65.600	-.056	-66.103	-66.002
5	196.000	-58.688	0.00000	0.00000	0.00000
6	29476823.6	20867155.4	-159.4465	-180.2891	-48.0002
7	.00	0.00	15010459.7	-15030262.3	41279805.2
8	6.42	.000	-9949.25	3925.00	17582.50
9	0.000	16.1552	-18571881.7	10310571.9	41279805.2
10	0.0	0.0	10645.71	-1030.57	17582.50
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	12199.188	316.576	608.157
14	.000	-117.095	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
QP4	.241.698	3523.314	28566.515	114.15602	.9772547
QP5	68.08001	132.23427	5761.634	17468.794	
QP6	1921.4111	4.2430872E+08		2318.299	4595.617
QP7	165.86252				

1	2636.095	1487.480	8205.858	0.0	1500.0
2	13.5283	59.9866	21032.679	20247.512	-3.777
3	.535	329.254	89.218	-87.355	89.250
4	14.009	58.592	-6.998	-64.966	-64.462
5	196.000	-55.172	0.00000	0.00000	0.00000
6	29906667.2	20868590.6	-159.4465	-180.2891	-48.0002
7	.00	0.00	14120708.9	-14673107.0	42752327.9
8	5.92	.001	-10708.20	4364.78	16620.62
9	0.000	15.6909	-17618153.0	10212500.8	42752327.9
10	0.0	0.0	11496.47	-1244.11	16626.62
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	12533.319	316.576	608.157
14	.000	-120.517	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
QP4	.241.1229	3523.293	28567.212	117.56303	.9694619
QP5	68.08044	132.24699	5762.250	17467.248	
QP6	2007.1829	4.2432471E+08		2318.914	4596.322
QP7	165.87818				

ACQUISITION OF SIGNAL - JOHANNESBURG
(E* = 5 DEGREES)

1	2650,000	1498.668	8236.327	0,0	1500,0
2	13,4934	59,0122	20981,792	20195,191	-3,749
3	,528	328,275	89,160	-87,262	89,197
4	13,973	57,557	-8,020	-64,291	-64,186
5	196,000	-54,608	0,00000	0,00000	0,00000
6	29974912,0	20868854,5	-159,4465	-180,2891	-48,0002
7	,00	0,00	13971002,2	-14611946,7	42982344,1
8	5,91	.000	-10824,30	4431,93	16463,24
9	0,000	15,6190	-17457387,6	10194974,5	42982344,1
10	0,0	0,0	11626,59	-1276,66	16463,24
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	12985,948	316,576	608,157
14	,000	-121,061	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2411303	3523,295	28567,286	118,10402	,9682192
QP5	68,08051	132,24907	5762,345	17467,018	
QP6	2021,0356	4,2432734E+08		2319,009	4596,437
QP7	165.88084				

1	2750,000	1577,397	8450,404	0,0	1500,0
2	13,2039	52,7398	20626,577	19830,403	-3,546
3	,477	321,971	88,725	-86,710	88,811
4	13,675	50,843	-14,630	-62,138	-62,029
5	196,000	-50,574	0,00000	0,00000	0,00000
6	30455403,5	20870985,4	-159,4465	-180,2891	-48,0002
7	,00	0,00	12848649,6	-14145676,0	44971588,2
8	5,80	.000	-11607,86	4864,87	15317,98
9	0,000	15,1253	-16249991,4	10056128,7	44971588,2
10	0,0	0,0	12584,64	-1496,07	15317,98
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	12953,345	316,576	608,157
14	,000	-124,899	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2411743	3523,360	28567,528	121,92303	,9594260
QP5	68,08113	132,26421	5762,989	17465,938	
QP6	2120,6643	4,2434637E+08		2319,651	4597,262
QP7	165.9,071				

1	2853,000	1652.910	8655,778	0,0	1500,0
2	12,8498	47,6129	20290,405	19485,968	-3,342
3	,427	316.817	88,250	-86,291	88,417
4	13,310	45.272	-20,078	-59,756	-59,643
5	195,000	-46.584	0,00000	0,00000	0,00000
6	30916715,5	20873472,1	-159,4465	-180,2891	-48,0002
7	,00	0,00	11652337,8	-13836822,7	46045326,9
8	5,70	.000	-12304,19	5288,32	14154,28
9	0,000	14,6715	-14959708,6	9896543,5	46045326,9
10	0,0	0,0	13285,20	-1691,96	14154,28
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	13301,044	316,576	608,157
14	,000	-128.619	0,000	0,000	33461,521
15	11661245,1	6263073,1	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2412022	3523.499	28567,288	125,62447	,9509103
QP5	68.08185	132,27932	5763,558	17464,354	
QP6	2220,3110	4,2436538E+08		2320,218	4596,069
QP7	165.92125				

1	2908,931	1695.818	8772,782	0,0	1500,0
2	12,6126	45,0423	20101,280	19292,591	-3,221
3	,397	314.232	87,948	-86,082	88,181
4	13,065	42.439	-22,832	-98,279	-58,163
5	196,000	-44.251	0,00000	0,00000	0,00000
6	31179031,8	20875075,3	-159,4465	-180,2891	-48,0002
7	,00	0,00	10916162,9	-13318527,7	46859085,7
8	5,64	.000	-12675,37	5504,65	13462,46
9	0,000	14,4218	-14164373,0	9793688,2	46859085,7
10	0,0	0,0	13701,94	-1797,60	13462,46
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	13496,638	316,576	608,157
14	,000	-138.762	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2412117	3523.611	28566,943	127,75504	,9460350
QP5	68.08230	132,28811	5763,857	17463,792	
QP6	2279,468	4,2437642E+08		2320,516	4596,527
QP7	165.93335				

ACQUISITION OF SIGNAL - TANANARIVE
(E* - 5 DEGREES)

1	2950.000	1724.996	8852.954	0.0	1500.0
2	12.4353	43.4212	19973.430	19162.048	-3.136
3	.376	312.602	87.727	-85.948	88.017
4	12.882	40.635	-24.579	-57.225	-57.108
5	196.000	-42.633	0.00000	0.00000	0.00000
6	31357488.8	20876243.7	-159.4465	-180.2891	-48.0002
7	.00	0.00	10390581.3	-13089518.7	47402041.1
8	5.61	.000	-12917.44	5646.57	12978.45
9	0.000	14.2552	-13596028.1	9718420.6	47402041.1
10	0.0	0.0	13973.44	-1867.31	12978.45
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	344.266	38.202	13628.848	316.576	608.157
14	.000	-132.233	0.000	0.000	33461.921
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2412154	3523.701	28566.621	129.21897	19427042
GP5	68.08263	132.29414	5764.049	17463.458	
GP6	2319.9869	4.2438401E+08		2320.708	4598.837
GP7	165.94170				

1	3050.000	1793.475	9040.624	0.0	1500.0
2	11.9640	39.9763	19679.713	18858.690	-2.931
3	.325	309.137	87.146	-85.654	87.613
4	12.395	36.749	-28.323	-54.601	-54.481
5	196.000	-38.717	0.00000	0.00000	0.00000
6	31776557.6	20879235.3	-159.4465	-180.2891	-48.0002
7	.00	0.00	9071486.5	-12508680.1	48640788.3
8	5.52	.000	-13451.60	5963.66	11795.74
9	0.000	13.8742	-12167932.0	9523674.5	48640788.3
10	0.0	0.0	14574.32	-2024.87	11795.74
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	344.266	38.202	13936.659	316.576	608.157
14	.000	-135.750	0.000	0.000	33461.921
15	11661245.1	6263073.0	50230978.3	2965366.8	193.88
16	72.45	121.43	0.00	0.00	0.0
GP4	.2412153	3523.956	28565.586	132.71639	19348374
GP5	68.08346	132.30849	5764.466	17462.828	
GP6	2419.7002	4.2440203E+08		2321.122	4599.554
GP7	165.96148				

1	3150,000	1858.190	9219,597	0,0	1500,0
2	11,4397	37,1243	19397,246	18575,854	-2,726
3	,274	306,269	86,497	-85,394	87,210
4	11,852	33,461	-31,466	-51,921	-51,800
5	196,000	-34,834	0,00000	0,00000	0,00000
6	32172924,1	20882387,7	-159,4465	-180,2891	-48,0002
7	,00	0,00	7702771,4	-11898033,7	49761104,8
8	5,43	,000	-13910,45	6243,33	10610,49
9	0,000	13,5262	-10683921,6	9313952,5	49761104,8
10	0,0	0,0	15092,48	-2167,23	10610,49
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	14224,456	316,576	608,157
14	,000	-139,177	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	,2412036	3524,255	28564,242	136,12586	,9273368
GP5	68,08433	132,32223	5764,810	17462,441	
GP6	2519,4971	4,2441930E+08		2321,465	4600,210
GP7	165,98013				

1	3250,000	1919,010	9388,679	0,0	1500,0
2	10,8662	34,7441	19137,979	18313,440	-2,523
3	,224	303,876	85,764	-85,157	86,808
4	11,257	30,653	-34,132	-49,211	-49,089
5	196,000	-30,979	0,00000	0,00000	0,00000
6	32545735,0	20885647,5	-159,4465	-180,2891	-48,0002
7	,00	0,00	6291789,2	-11261145,9	50762923,6
8	5,36	,000	-14297,51	6489,04	9426,33
9	0,000	13,2092	-9152048,4	9090656,0	50762923,6
10	0,0	0,0	15532,27	-2296,74	9426,33
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	14492,274	316,576	608,157
14	,000	-142,523	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
GP4	,2411819	3524,587	28562,645	139,45586	,9202277
GP5	68,08522	132,33528	5765,089	17462,268	
GP6	2619,2615	4,2443571E+08		2321,743	4600,797
GP7	165,99730				

1	3350,000	1975.825	9548,495	0,0	1500,0
2	10,2468	32,7418	18897,828	18071,297	-2,321
3	,174	301,864	84,927	-84,938	86,412
4	10,613	28,234	-36,417	-46,488	-46,368
5	195,000	-27,150	0,00000	0,00000	0,00000
6	32894262,2	20868966,5	-159,4465	-180,2891	-48,0002
7	,00	0,00	4845554,2	-10601250,9	51646506,5
8	5,29	.000	-14616,03	6703,98	8246,23
9	0,000	12,9215	-7579946,4	8854960,7	51646506,5
10	0,0	0,0	15897,69	-2415,55	8246,23
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	14740,184	316,576	608,157
14	,000	-145,796	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2411520	3524,945	28560,852	142,71426	,9135327
QP5	68,08611	132,34761	5765,308	17462,280	
QP6	2719,1159	4,2445119E+08		2321,961	4601,313
QP7	166,01275				

1	3450,000	2028,537	9690,836	0,0	1500,0
2	9,5851	31,0451	18676,690	17849,248	-2,121
3	,124	300,160	83,957	-84,734	86,023
4	9,925	26,134	-38,396	-43,764	-43,643
5	196,000	-23,344	0,00000	0,00000	0,00000
6	33217885,5	20892301,8	-159,4465	-180,2891	-48,0002
7	,00	0,00	3370768,8	-9921279,1	52412386,8
8	5,22	.000	-14868,99	6891,04	7072,65
9	0,000	12,6614	-5974866,1	8607835,8	52412386,8
10	0,0	0,0	16192,42	-2525,64	7072,65
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	14968,288	316,576	608,157
14	,000	-149,003	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,88
16	72,45	121,43	0,00	0,00	0,0
QP4	.2411156	3525,320	28558,914	145,90837	,9072732
QP5	68,08700	132,35919	5765,475	17462,447	
QP6	2819,0210	4,2446574E+08		2322,126	4601,755
QP7	166,02631				

1	3550.000	2077.068	9818.324	0.0	1500.0
2	8.8844	29.5982	10474.456	17647.089	-1.923
3	.076	298.709	82.817	-84.540	85.645
4	9.196	24.300	-40.126	-41.044	-40.925
5	196.000	-19.558	0.00000	0.00000	0.00000
6	33516077.7	20895614.8	-159.4465	-180.2891	-48.0002
7	.00	0.00	1873850.18	-9223884.4	53061322.6
8	5.16	.000	-15059.11	7052.86	5907.65
9	0.000	12.4275	-4343708.1	8350063.4	53061322.6
10	0.0	0.0	18419.77	-2628.79	5907.65
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.286	38.202	19176.703	316.576	608.157
14	.000	-152.151	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.89
16	72.45	121.43	0.00	0.00	0.0
QP4	.2410741	3525.705	28556.878	149.04502	.9014682
QP5	68.08787	132.37002	5765.597	17462.740	
QP6	2918.9769	4.2447934E+08		2322.247	4602.124
QP7	166.03790				

1	3650.000	2121.349	9924.108	0.0	1500.0
2	8.1481	28.3575	18291.010	17464.609	-1.727
3	.028	297.466	81.451	-84.356	85.279
4	8.430	22.690	-41.653	-38.333	-38.218
5	196.000	-15.792	0.00000	0.00000	0.00000
6	33788391.8	20898871.0	-159.4465	-180.2891	-48.0002
7	.00	0.00	360960.16	-8511469.9	53594258.8
8	5.11	.000	-15188.82	7191.81	4752.91
9	0.000	12.2183	-2693056.7	8082255.8	53594258.8
10	0.0	0.0	16582.76	-2726.60	4752.91
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.286	38.202	15465.556	316.576	608.157
14	.000	-155.245	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.89
16	72.45	121.43	0.00	0.00	0.0
QP4	.2410291	3526.093	28554.788	152.13061	.8961354
QP5	68.08872	132.38011	5765.681	17463.131	
QP6	3018.9823	4.2449200E+08		2322.330	4602.421
QP7	166.04746				

1	3735,000	2161.324	18001.954	0,0	1500,0
2	7,3797	27,2893	18126,242	17301,591	-1,534
3	-,020	296,399	79,777	-84,180	84,929
4	7,629	21,273	-43,013	-35,634	-35,522
5	196,000	-12,543	0,00000	0,00000	0,00000
6	34034450,5	20902039,7	-159,4465	-180,2891	-48,0002
7	,00	0,00	-1161973,1	-7766213,6	54012295,4
8	5,06	,000	-15260,32	7310,03	3609,87
9	0,000	12,0327	-1029211,1	7804872,0	54012295,4
10	0,0	0,0	16684,06	-2820,54	3609,87
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	15534,278	316,576	608,157
14	,000	-158,292	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,43	0,00	0,00	0,0
QP4	.2409819	3526,478	28552,884	155,17114	18912906
QP5	68,08954	132,38947	5765,733	17463,894	
QP6	3119,354	4,2450375E+08		2322,382	4602,649
QP7	166,05501				

1	3850,000	2196,943	10045,408	0,0	1500,0
2	6,5824	26,3666	17980,046	17157,819	-1,342
3	-,067	299,480	77,669	-84,011	84,597
4	6,799	20,024	-44,236	-32,946	-32,839
5	196,000	-8,310	0,00000	0,00000	0,00000
6	34253936,5	20905093,1	-159,4465	-180,2891	-48,0002
7	,00	0,00	-2689227,4	-7050090,7	54316662,6
8	5,02	,000	-15275,54	7409,44	2479,71
9	0,000	11,8697	641783,0	7518233,7	54316662,6
10	0,0	0,0	19726,11	-2911,90	2479,71
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	15685,101	316,576	608,157
14	,000	-161,299	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
QP4	.2409337	3526,856	28550,002	158,17228	18869481
QP5	68,09033	132,39812	5765,761	17464,106	
QP6	3219,1335	4,2451462E+08		2322,409	4602,810
QP7	166,06059				

1	3950,000	2228.169	10050.371	0,0	1500,0
2	5,7595	25,5684	17852,325	17033,081	-1,153
3	-1,112	294,687	74,922	-83,847	84,284
4	5,941	13,924	-45,343	-30,269	-30,168
5	196,000	-4,591	0,00000	0,00000	0,00000
6	34446585,1	20908006,7	-159,4465	-180,2891	-48,0002
7	,00	0,00	-4219261,4	-6304896,8	54808701,1
8	4,98	,000	-15236,18	7491,72	1363,45
9	0,000	11,7284	2314104,2	7222539,3	54508701,1
10	0,0	0,0	16710,95	-3001,84	1363,45
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	15816,090	316,576	608,157
14	,000	-164,259	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
GP4	.2408858	3527,220	28548,575	161,13940	,8831206
GP5	68,09107	132,40610	5765,769	17464,645	
GP6	3319,2738	4,2452464E+08		2322,418	4602,909
GP7	166,06428				

1	4050,000	2254,969	10017,577	0,0	1500,0
2	4,9145	24,8776	17742,992	16927,179	-1,968
3	-1,157	294,004	71,186	-83,687	83,993
4	5,1061	17,956	-46,355	-27,803	-27,508
5	196,000	-887	0,00000	0,00000	0,00000
6	34612177,2	20910758,1	-159,4465	-180,2891	-48,0002
7	,00	0,00	-5734692,5	-5552268,2	54589846,4
8	4,95	,000	-15143,71	7558,36	261,99
9	0,000	11,6080	3982127,7	6917878,3	54589846,4
10	0,0	0,0	16640,43	-3091,89	261,99
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	15927,946	316,576	608,157
14	,000	-167,208	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
GP4	.2408390	3527,568	28546,631	164,07763	,8798193
GP5	68,09177	132,41343	5765,769	17465,190	
GP6	3419,4527	4,2453383E+08		2322,418	4602,950
GP7	166,06618				

1	4150.000	2277.316	9952.425	0.0	1500.0
2	4.506	24.2807	17651.972	16839.924	-1.780
3	-1.202	293.417	65.820	-83.532	83.727
4	4.162	17.109	-47.288	-24.946	-24.858
5	196.000	2.804	0.00000	0.00000	0.00000
6	34750534.2	20913327.3	-159.4465	-180.2891	-48.0002
7	.00	0.00	-7242275.0	-4793701.0	54561617.7
8	4.93	.000	-14999.39	7610.67	-823.90
9	0.000	11.5080	5640398.2	6604243.5	54561617.7
10	0.0	0.0	16516.13	-3181.46	-823.90
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	16020.900	316.576	608.157
14	.000	-173.122	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.89
16	72.45	121.44	0.00	0.00	0.0
QP4	.2407944	3527.894	28544.798	166.99187	.8770536
QP5	68.09242	132.42012	5765.751	17465.723	
QP6	3519.6663	4.2454223E+08		2322.400	4602.937
QP7	166.06640				

1	4250.000	2295.190	9862.303	0.0	1500.0
2	3.1713	23.7668	17579.201	16771.144	-1.596
3	-1.245	292.915	57.983	-83.379	83.486
4	3.247	16.374	-48.155	-22.295	-22.215
5	196.000	6.483	0.00000	0.00000	0.00000
6	34861513.4	20915696.0	-159.4465	-180.2891	-48.0002
7	.00	0.00	-8732878.6	-4030573.7	54425609.4
8	4.91	.000	-14804.29	7649.77	-1893.49
9	0.000	11.4277	7283609.0	6281543.7	54425609.4
10	0.0	0.0	16339.36	-3272.81	-1893.49
11	0.000	0.000	0.000	0.000	0.000
12	0.0	0.0	-31.908	0.000	34125.517
13	346.266	38.202	16095.012	316.576	608.157
14	.000	-173.016	0.000	0.000	33461.521
15	11661245.1	6263073.0	50230978.3	2965366.8	193.89
16	72.45	121.44	0.00	0.00	0.0
QP4	.2407527	3528.196	28543.098	169.88665	.8748315
QP5	68.09302	132.42619	5765.734	17466.229	
QP6	3619.9103	4.2454985E+08		2322.382	4602.876
QP7	166.06509				

1	4350,000	2308.576	9754,047	0,0	1500,0
2	2,2800	23,3272	17524,629	16720,685	- ,413
3	- ,287	292,489	44,028	-83,229	83,273
4	2,320	15,743	-48,968	-19,649	-19,577
5	196,000	10,148	0,00000	0,00000	0,00000
6	349450,4,3	20917847,6	-159,4465	-180,2891	-48,0002
7	,00	0,00	-10201468,9	-3264197,2	54183486,5
8	4,89	,000	-14559,26	7676,59	-2946,08
9	0,000	11,3669	8906557,6	5949615,2	54183486,5
10	0,0	0,0	16111,21	-3366,13	-2946,08
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	16150,370	316,576	608,157
14	,000	-175,893	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
QP4	.2407147	3526,470	28541,553	172,76715	,8731594
QP5	68,09356	132,43167	5765,717	17466,693	
QP6	3720,1802	4,2455673E+08		2322,365	4602,770
QP7	166,06241				

1	4450,000	2317,463	9632,899	0,0	1500,0
2	1,3800	22,9550	17488,217	16688,412	- ,232
3	- ,329	292,133	21,505	-83,080	83,088
4	1,384	15,210	-49,736	-17,005	-16,941
5	196,000	13,801	0,00000	0,00000	0,00000
6	35000925,8	20919766,9	-159,4465	-180,2891	-48,0002
7	,00	0,00	-11643088,2	-2495639,8	53836981,7
8	4,88	,000	-14264,97	7691,90	-3981,01
9	0,000	11,3252	10504163,1	5608233,0	53836981,7
10	0,0	0,0	15832,54	-3461,97	-3981,01
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38,202	16187,847	316,576	608,157
14	,000	-178,759	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
QP4	.2406810	3528,713	28540,181	175,63726	,8720421
QP5	68,09405	132,43657	5765,702	17467,102	
QP6	3820,4709	4,2456287E+08		2322,351	4602,626
QP7	166,05850				

1	4550,000	2321.844	9502,521	0,0	1500,0
2	,4748	22,6447	17469,938	16674,215	-,052
3	-,369	291.841	-8,573	-82,932	82,933
4	,444	14.770	-50,469	-14,360	-14,305
5	196,000	17.441	0,00000	0,00000	0,00000
6	35029224,5	20921440,2	-159,4465	-180,2891	-48,0002
7	,00	0.00	-13052837,5	-1726139,7	53387895,6
8	4,88	.000	-13921,93	7696,33	-4997,59
9	0,000	11.3825	12071404,1	5257121,6	53387895,6
10	0,0	0,0	15504,01	-3560,78	-4997,59
11	0,000	0.000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	16205,184	316,576	608,157
14	,000	178.382	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
GP4	.2406522	3528.923	28539,000	178,50154	,8714828
GP5	68.09447	132.44088	5765,694	17467,446	
GP6	3920,7773	4,2456828E+08		2322,343	4602,449
GP7	166.05356				

1	4602,344	2322.340	9431,456	0,0	1500,0
2	,0000	22,5054	17467,596	16673,958	,042
3	-,390	291.711	-23,123	-82,854	82,864
4	-,049	14.576	-50,841	-12,974	-12,924
5	196,000	19.341	0,00000	0,00000	0,00000
6	35033013,4	20922213,5	-159,4465	-180,2891	-48,0002
7	,00	0.00	-13776419,4	-1323319,4	53112549,9
8	4,88	.000	-13723,04	7694,47	-5522,15
9	0,000	11.2982	12877988,0	5069352,1	53112549,9
10	0,0	0,0	15312,32	-3613,81	-5522,15
11	0,000	0.000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	38.202	16207,147	316,576	608,157
14	,000	176.887	0,000	0,000	33461,521
15	11661245,1	6263073,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
GP4	.2406393	3529.019	28538,463	179,99995	,8714130
GP5	68.09466	132.44291	5765,692	17467,396	
GP6	3973,2857	4,2457083E+08		2322,342	4602,346
GP7	166.05062				

1	4602,344	2322,342	9431,456	0,0	1900,0
2	.0000	22,5054	17467,596	16673,958	,042
3	-.390	291,711	-23,123	-82,854	62,864
4	-.049	14,575	-50,841	-12,974	-12,924
5	196,000	19,341	0,00000	0,00000	0,00000
6	35033013,4	20922213,5	-159,4465	-180,2891	-48,0002
7	.00	0,00	-13776419,4	-1323319,4	53112549,9
8	4,88	.000	-13723,04	7694,47	-5522,15
9	0,000	11,2982	12877988,0	5069352,1	53112549,9
10	0,0	0,0	15312,32	-3613,81	-5522,15
11	0,000	0,000	0,000	0,000	0,000
12	0,0	0,0	-31,908	0,000	34125,517
13	346,266	33,202	16207,147	316,576	608,157
14	.000	176,887	0,000	0,000	33461,521
15	11661245,1	6263,73,0	50230978,3	2965366,8	193,89
16	72,45	121,44	0,00	0,00	0,0
GP4	.2405393	3529,119	20538,463	179,99995	,8714130
GP5	68,09466	132,44291	5765,692	17467,596	
GP6	3973,2657	4,2457,83E+08		2322,342	4602,346
GP7	166,05062				

APOGEE OF FINAL ORBIT

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY

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